

# ZOOTAXA

4707

## The genus *Pseudolycoriella* Menzel & Mohrig, 1998 (Diptera, Sciaridae) in New Zealand

ARNE KÖHLER

*Senckenberg Deutsches Entomologisches Institut, Eberswalder Straße 90, D-15374 Müncheberg, Germany.*  
E-mail: arne.koehler@senckenberg.de



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## Abstract

In the course of the present study 28 species of the genus *Pseudolycoriella* Menzel & Mohrig, 1998 from New Zealand were described as new to science: *Pseudolycoriella aotearoa* sp. n., *Psl. dagae* sp. n., *Psl. dentitegmena* sp. n., *Psl. fiordlandia* sp. n., *Psl. gonotegmena* sp. n., *Psl. hauta* sp. n., *Psl. huttoni* sp. n., *Psl. jaschhofi* sp. n., *Psl. jejunella* sp. n., *Psl. kaikoura* sp. n., *Psl. maddisoni* sp. n., *Psl. mahanga* sp. n., *Psl. nahenahe* sp. n., *Psl. orite* sp. n., *Psl. plicitegmena* sp. n., *Psl. porehu* sp. n., *Psl. porotaka* sp. n., *Psl. puhihi* sp. n., *Psl. raki* sp. n., *Psl. robustotegmena* sp. n., *Psl. subtilitegmena* sp. n., *Psl. sudhausi* sp. n., *Psl. teo* sp. n., *Psl. tewaipounamu* sp. n., *Psl. tuakana* sp. n., *Psl.*

*wernermohrigi* sp. n., *Psl. whakahara* sp. n., and *Psl. whena* sp. n. *Pseudolycoriella cavatica* (Skuse, 1888), a widely distributed species, was recorded from New Zealand for the first time, and recognised as a senior synonym of *Spathobdella setigera* Hardy, 1960 syn. n. Apart from *Psl. kaikoura* and *Psl. cavatica* all New Zealand *Pseudolycoriella* species group in four different clusters: the *Psl. bispina* complex, the *Psl. jejuna* complex, the *Psl. macrotegmena* complex, and the *Psl. zealandica* complex. The monophyly of those four species complexes was confirmed by a genetic analysis based on two mitochondrial genes (COI and 16S) and one nuclear gene (28S). A key to the species is given.

**Key words:** 16S, 28S, Australasian region, COI, DNA sequencing, key, morphology, new species, new synonym, systematics, taxonomy

## Introduction

Menzel & Mohrig (1998) recognised the morphological unity of several sciarid species which were previously scattered within the genera *Sciara* Meigen, *Corynoptera* Winnertz, and *Lycoriella* Frey. Accordingly, they transferred those species to the newly erected genus *Pseudolycoriella* Menzel & Mohrig. The two authors stated that the following apomorphic characters demonstrate the monophyly of the new genus: one whip-lash hair on the apical third of the gonostylus, claws with teeth, and a tibial organ consisting of a dense row of bristles without a basal ridge. The monophyly of the genus *Pseudolycoriella* was later verified by a genetic analysis by Shin *et al.* (2013). Since 1998 several new species have been described and assigned to this genus. As of May 2019, *Pseudolycoriella* comprised 132 species (Menzel, personal communication). Several authors have stated that *Pseudolycoriella* is probably one of the most species-rich genera of the Sciaridae (e.g. Menzel & Mohrig 2000; Rudzinski *et al.* 2016). Species of this genus are found in all biogeographic realms, but with different levels of diversity. Only a small proportion of all known species is found in the Palaearctic realm (Menzel & Mohrig 2000), while the southern hemisphere is much more diverse (e.g. Vilkamaa *et al.* 2012; Mohrig 2013).

The intrageneric systematics of *Pseudolycoriella* is still in its infancy. Menzel & Mohrig (2000) established three species groups—*Psl. bruckii* group, *Psl. horribilis* group, and *Psl. morenae* group—mainly to allow an easier use of identification keys, and thus implemented a first provisional system of *Pseudolycoriella*. *Pseudolycoriella horribilis* (Edwards), the only member of the *Psl. horribilis* species group, is characterized by the presence of a truncated tooth on the gonostylus that is not homologous with the gonostylar tooth of other sciarid taxa (Menzel & Mohrig 2000). The two species of the *Psl. morenae* group possess conspicuous lobes with bristles on the inner gonocoxites and lack any teeth on the claws. Menzel & Mohrig (2000) placed the remaining 17 species known at that time in the *Psl. bruckii* group, which comprises the majority of all species. The following diagnostic characters were given for this group: toothed claws, absence of lobes on the inner base of the gonocoxites, the absence of a tooth on the gonostylus, and up to five spines on the gonostylus (rarely without any spines). Later Mohrig (2013) amplified the provisional system by adding three further species groups to accommodate newly described *Pseudolycoriella* species from Papua New Guinea. These groups are the *Psl. longicostalis* group, the *Psl. quadrispinosa* group, and the *Psl. triacanthula* group. The *Psl. longicostalis* group comprises tiny species with deep sensory pits on the flagellomeres, a gonostylus with two spines (sometimes reduced), a tegmen without any secondary structures, and a conspicuous row of longitudinal bristles on the hind tibia. However, the delimitation between this group and the *Psl. bruckii* group remained vague. The *Psl. quadrispinosa* group is characterised by the presence of more than two spines on the gonostylus and a gradual reduction of the whip-lash hair. The species of the *Psl. triacanthula* group are relatively large and bear three or more robust spines on the gonostylus. The attempt to apply this species group concept to the New Zealand species *Psl. frederickedwardsi* Köhler, and *Psl. tonnoiri* Köhler failed, and Köhler & Mohrig (2016) did not propose a new provisional species group to accommodate them. The first valid intrageneric taxon of *Pseudolycoriella* was established by Heller (2012), who changed the former genus *Ostroverkhovana* Komarova into a subgenus of *Pseudolycoriella*. However, Mohrig & Kauschke (2019) disagreed with Heller (2012) and included *Ostroverkhovana* in *Pseudolycoriella* without distinguishing any subgenera. A possible congruence of *Pseudolycoriella* and *Eugnoriste* Coquillett is still to be investigated (Vilkamaa *et al.* 2012).

The sciarids of New Zealand have attracted little attention by previous workers. Only two major studies (Tonnoir & Edwards 1927; Mohrig & Jaschhof 1999) and a few minor ones (Hutton 1881; Wisely 1959; Davies 1988; Köhler & Mohrig 2016) dealt with this dipteran family. A total of 54 sciarid species are known from New Zealand, seven of which belong to *Pseudolycoriella*.

## Materials and methods

**Collecting and depository.** The majority of the sciarid flies examined were obtained as bycatch from a survey of New Zealand Cecidomyiidae by Catrin and Mathias Jaschhof between 2001 and 2002 (Jaschhof & Jaschhof 2003a, 2003b, 2004; collecting permit #9900/143/3/04 issued by the Department of Conservation, New Zealand). Another important part of the material was collected by Peter A. Maddison between 2014 and 2016. Only a small number of examined specimens was caught by other entomologists. Most specimens were collected with Malaise traps, aspirators, or sweep nets. Rather rarely, light traps, pitfall traps, and pan traps were used. Additionally, historic type material was borrowed from the relevant collections. The studied material is deposited in the following scientific collections: the Natural History Museum, London, United Kingdom (BMNH); the Centre for Biodiversity Genomics, Guelph, Canada (CBG); the New Zealand Arthropod Collection, Auckland, New Zealand (NZAC); the private collection of Werner Mohrig, Poseritz, Germany (PWMP); the Senckenberg Deutsches Entomologisches Institut, Müncheberg Germany (SDEI); and the Finnish Museum of Natural History, University of Helsinki, Helsinki, Finland (UZMH).

**Morphology.** All sciarids were stored in 70% ethanol after they were collected. Prior to examination, the specimens were mounted in Canada balsam on glass slides following the instructions of Mohrig & Jaschhof (1999), and Menzel & Mohrig (2000). Accordingly, on each slide the hypopygium is mounted with the ventral side up, separated from the rest of the body, which lies on its right lateral side. Therefore the lengths of both these separated body parts have to be added, to obtain the total body length. The right wing was also separated and covered by a cover slip. For some specimens belonging to morphologically challenging species tergite IX was dissected from the remaining hypopygium to allow a better view of the tegmen. Morphological examination was conducted with an Olympus BX50 Microscope fitted with an Olympus U-DA drawing tube. The drawings were digitised using the software Adobe Illustrator CS6 according to Coleman (2003, 2009). Scanning electron microscope (SEM) images of details of the male genitalia of a species of the *Psl. jejuna* complex were obtained. One specimen was dehydrated sequentially with ethanol (70–98%) and acetone (100%), then critical-point dried, glued on a micro pin, and sputtered with gold. The images were taken with a SEM JSM-6060LV (JEOL) at an acceleration voltage of 8–12 kV.

The general terminology and the application of taxonomically important measurements follow Menzel & Mohrig (2000) (Fig. 22). The length of the fourth flagellomere, which is necessary for the length-width ratio, represents the whole length i.e. the combined lengths of the flagellomere's body and the flagellomere's neck. The width of the fourth flagellomere was measured at the widest part, mostly at the apex of the flagellomere's body. The notation of the wing veins follows Hippa *et al.* (2010) (Fig. 9) and the use of the terms anterior portion of gonocoxal apodeme, posterior portion of gonocoxal apodeme, and parameral apodeme derives from Jaschhof & Jaschhof (2009) (Fig. 11). For specimens of the *Psl. bispina* and the *Psl. jejuna* complex the term lateral lobes (e.g. *ll* in Fig. 22) is used. This term is only used for descriptive purposes and should not be misinterpreted as a statement about homology. Where larger series of type specimens were available, a sample of at least ten specimens was measured using a micrometre. Specimens that could not be reliably determined to species level were not included in the type series, but are included as additional material. The order in which the species are treated is more or less arbitrary, although an attempt has been made to group closely related species together for easier comparison.

**Molecular analysis.** All specimens that underwent a molecular analysis are labelled with a unique number, consisting of the prefix “SDEI-Dipt-” and a seven-digit number. DNA was extracted with the E.Z.N.A.® Tissue DNA Kit (Omega Bio-tek Inc.), following the manufacturer's instructions. To obtain a greater amount of DNA from old material, which had usually been stored for longer periods under poor conditions, the first extraction step—the tissue lysis—was prolonged overnight. Additionally, whole specimens were used in the lysis procedure instead of some individual body parts. Attempts were made to obtain sequences of the mitochondrial genes COI and 16S, and the nuclear gene 28S via polymerase chain reactions (PCR) following Shin *et al.* (2013). In this phylogenetic study the nuclear gene 18S was also sequenced. However, the 18S gene could not be reliably obtained from the mostly older material which was available. In general, the primer pair LCO\_1490 and HCO\_2198 was used for COI amplifying (Folmer *et al.* 1994). If those primers did not show sufficient results, the primers LepF1 and LepR1 (Hebert *et al.* 2004), or LCO\_1490 and HCO\_2198 in combination with the internal primers sym-C1-J-1718 (Simon *et al.* 1994) and C1-N1760 (Prous *et al.* 2011) were used. The length of the COI sequence is 658 base pairs (bp). For the 16S sequence the primers 16SAR-L and 16SBR-H (Palumbi *et al.* 1991) were used. Due to a high percentage of failures in comparison to the other markers, an alternative primer set was designed. The new primers *Psl\_16S\_for*

and *Psl\_16S\_rev* bind within the 16S region and therefore yield a shorter sequence than the primer pair 16SAR-L and 16SBR-H. The length of the 16S sequence is 538 bp. A part of the nuclear 28S sequence was obtained using the four primers 28S A, 28S-rD7b1, 28S-rD5b, and 28S-Rd48a (Friedrich & Tautz 1997; Whiting *et al.* 1997) as done by Shin *et al.* (2013). Furthermore, the primers 28SF2 and 28SB2 (Boevé *et al.* 2013) were used to get an additional part of the 28S gene, which is located upstream (i.e., at the 5' end of the coding strand) of the former 28S locus. Both sequences overlap in the nuclear genome and can therefore be easily pasted together to yield a sequence of 1,857 bp. All used primers, their annealing temperature and the the number of PCR cycles are listed in Table 1. PCR products were purified with Exonuclease I and FastAP Thermosensitive Alkaline Phosphatase (Life Technologies, Darmstadt, Germany) and sent to Macrogen Europe (Amsterdam, The Netherlands) for Sanger sequencing. The primers from each PCR were also used for sequencing. The software Geneious 11.0.5 was used to assemble the resulting ab1-files provided by Macrogen and aligned with the online software MAFFT version 7 (<https://mafft.cbrc.jp/alignment/software/>; Katoh *et al.* 2002; Katoh & Standley 2013; Katoh *et al.* 2017). The sequences used for the phylogenetic analyses were uploaded to GenBank (<https://www.ncbi.nlm.nih.gov/genbank/>). The accession numbers are listed in Table 2. Residual DNA extracts are deposited in the SDEI.

The pairwise p-distances (uncorrected) for the genes COI and 28S were calculated with the software MEGA7 (Kumar *et al.* 2016) for each species. The maximal intraspecific p-distances between all available sequences of a species and the lowest p-distance to another species (“nearest neighbour”) are given in each species account. Due to a future analysis, not all COI sequences used for the calculation of the p-distances are yet available online.

All three genes were used for the phylogenetic analysis. Each gene was aligned separately using default settings and afterwards concatenated using the software FASconCAT-G v1.04 (Kück & Longo 2014). The phylogenetic analysis was carried out with the software IQ-TREE 1.6.1 (Nguyen *et al.* 2015) using the implemented tool ModelFinder (Kalyaanamoorthy *et al.* 2017) for an automatic model selection. The statistical validation of the phylogenetic tree was undertaken using the ultrafast bootstrap approximation [UFBoot] (Minh *et al.* 2013; Hoang *et al.* 2018). For the UFBoot estimation 1,000 replicates were deployed. As outgroup, two species of Diadocidiidae (Diptera, Sciaroidea) and one species of Scatopsidae (Diptera, Scatopoidea) were used (see Table 2). The scatopsid species—*Coboldia* sp.—was used to root the phylogenetic tree.

## Key to the males of New Zealand *Pseudolycoriella* species

1. Gonostylus with one or two obvious spines ..... *Psl. bruckii* group, 2
- Gonostylus with more than two small spines ..... *Psl. macrotegmena* complex, 26
2. Gonostylus with two spines ..... 3
- Gonostylus with one spine ..... 11
3. Wing length greater than 2.4 mm; length of gonocoxites more than 200 µm ..... 4
- Wing length less than 2.4 mm; length of gonocoxites 200 µm or less ..... 5
4. Base of the ejaculatory apodeme horseshoe-shaped ..... *Psl. zealandica* (Edwards)
- Base of the ejaculatory apodeme elongate and slender ..... *Psl. aotearoa* sp. n.
5. Fourth flagellomere less than twice as long as wide ..... *Psl. cavatica* (Skuse)
- Fourth flagellomere more than twice as long as wide ..... *Psl. bispina* complex, 6
6. Fourth flagellomere less than three times as long as wide, with dense setae (Fig. 5) ..... *Psl. puhihi* sp. n.
- Fourth flagellomere at least three times as long as wide, with sparsely scattered setae (e.g. Fig. 4) ..... 7
7. Wings slender, anal area weakly developed ..... 8
- Wings of normal shape, anal area well developed ..... 9
8. Wing length less than 2.2 mm; c/w ratio greater than 0.65 ..... *Psl. orite* sp. n.
- Wing length 2.2 mm or more; c/w ratio less than 0.65 ..... *Psl. porehu* sp. n.
9. Base of the ejaculatory apodeme lyre-shaped; apex of tegmen surrounded by a sclerotized margin (Figs 14 & 18); body length more than 1.8 mm, gonocoxites of normal length ..... 10
- Base of the ejaculatory apodeme u-shaped; apex of tegmen with membranous area (Fig. 15), body length less than 1.8 mm, gonocoxites short ..... *Psl. teo* sp. n.
10. Apex of  $R_5$  with macrotrichia only on ventral side; hind tibia with ten or more robust bristles in a longitudinal row ..... *Psl. bispina* Mohrig
- Apex of  $R_5$  with macrotrichia on both sides; hind tibia with less than ten robust bristles in a longitudinal row ..... *Psl. mahanga* sp. n.
11. Fourth flagellomere less than twice as long as wide; tegmen apically roundish (Fig. 11) ..... *Psl. kaikoura* sp. n.
- Fourth flagellomere more than twice as long as wide; tegmen with a pronounced apex (at in Fig. 22) ..... *Psl. jejuna* complex, 12
12. Scape and pedicel bright yellowish, contrasting strongly with the brown flagellomeres ..... 13

|  |                                      |
|--|--------------------------------------|
| - Scape and pedicel pale brown, contrasting slightly with flagellomeres  | 17                                   |
| 13. Body length less than 2.5 mm   | 14                                   |
| - Body length greater than 2.5 mm  | 15                                   |
| 14. Fourth antennal flagellomere at least 2.8 times longer than broad; gonostylus more than 2.8 times longer than broad; wing length less than 2.2 mm (ca. 1.9–2.1 mm)   | <i>Psl. whena</i> sp. n.             |
| - Fourth antennal flagellomere less than 2.8 times longer than broad; gonostylus less than 2.8 times longer than broad; wing length 2.2 mm                               | <i>Psl. nahenahae</i> sp. n.         |
| 15. Ejaculatory apodeme slender (Fig. 39); fourth antennal flagellomere less than 2.6 times as long as broad   | <i>Psl. porotaka</i> sp. n.          |
| - Ejaculatory apodeme broad (Fig. 42); fourth antennal flagellomere at least 2.6 times longer than broad   | 16                                   |
| 16. Gonostylus more than 2.8 times as long as broad; inner base of gonostylus with a conspicuous angle (ba in Fig. 42)   | <i>Psl. dagae</i> sp. n.             |
| - Gonostylus less than 2.8 times as long as broad; inner base of gonostylus without or only with a minor angle (Fig. 41)   | <i>Psl. raki</i> sp. n.              |
| 17. Ratio $R_1/R$ less than 0.80   | 18                                   |
| - Ratio $R_1/R$ greater than or equal to 0.80  | 22                                   |
| 18. Mesonotum with long and dense setae; 5–6 bristles on the scutellum   | <i>Psl. hauta</i> sp. n.             |
| - Mesonotum with normal setosity; 2–4 bristles on the scutellum  | 19                                   |
| 19. Fourth antennal flagellomere less than 2.8 times longer than broad   | 20                                   |
| - Fourth antennal flagellomere more than 2.8 times longer than broad   | <i>Psl. sudhausi</i> sp. n.          |
| 20. Small species; wing length less than 2.5 mm; gonostylus slender  | <i>Psl. jejunella</i> sp. n.         |
| - Larger species; wing length greater than 2.5 mm  | <i>Psl. maddisoni</i> sp. n.         |
| 22. Apical cavity on gonostylus prominent and extensively bare, without microtrichia (Figs 20 & 22)  | 23                                   |
| - Apical cavity on gonostylus absent or inconspicuous, or with microtrichia  | 24                                   |
| 23. Wing length greater than 3.0 mm  | <i>Psl. whakahara</i> sp. n.         |
| - Wing length less than 3.0 mm   | <i>Psl. tewaipounamu</i> sp. n.      |
| 24. Ejaculatory apodeme slender (Figs 37 & 39)   | <i>Psl. sudhausi</i> sp. n.          |
| - Ejaculatory apodeme broad (e.g. Fig. 41)   | 25                                   |
| 25. Apical spine on the gonostylus short, not protruding from the surrounding setae (Figs 30–31); mid tibia without robust bristles among the vestiture                  | <i>Psl. tuakana</i> sp. n.           |
| - Apical spine on the gonostylus slightly longer, protruding from the surrounding setae (Figs 25–26); mid tibia with robust bristles among the vestiture                 | <i>Psl. jejuna</i> (Edwards)         |
| 26. Tegmen laterally with small teeth (lt in Fig. 52)  | 31                                   |
| - Tegmen laterally without small teeth   | 27                                   |
| 27. Tegmen basolaterally with robust projections (Fig. 59), apex of gonostylus broad   | <i>Psl. breviseta</i> Mohrig         |
| - Tegmen basolaterally without projections, apex of gonostylus not broader than base   | 28                                   |
| 28. Tegmen large with lateral ledges (Fig. 55); gonostylus strongly curved   | <i>Psl. fiordlandia</i> sp. n.       |
| - Tegmen of normal proportions; gonostylus elongated   | 29                                   |
| 29. Tegmen with a medial, hood-like structure (Fig. 56); gonostylus longer, usually more than 3.5 times as long as wide  | <i>Psl. jaschhofi</i> sp. n.         |
| - Tegmen without a medial structure; gonostylus shorter, usually less than 3.5 times as long as wide   | 30                                   |
| 30. Tegmen with recurved lateral edges; fourth flagellomere more than 2.8 times as long as broad   | <i>Psl. frederickedwardsi</i> Köhler |
| - Tegmen without lateral structures; fourth flagellomere equal to or less than 2.8 times as long as broad  | <i>Psl. tonnoiri</i> Köhler          |
| 31. Tegmen with teeth laterally and apically (Fig. 60)   | <i>Psl. dentitegmena</i> sp. n.      |
| - Tegmen with lateral teeth only   | 32                                   |
| 32. Tegmen with dorsal structures (ds in Fig. 52); spines on gonostylus more transversely oriented   | 33                                   |
| - Tegmen without dorsal structures; gonostylus bulging apically, spines more longitudinally orientated   | <i>Psl. macrotegmena</i> Mohrig      |
| 33. Base of vein M longer than M-fork; sclerotized margin of tegmen very broad; tegmen with dorsal structures strongly developed, reaching apex of tegmen                | <i>Psl. robustotegmena</i> sp. n.    |
| - Base of M vein shorter than M-fork; sclerotized margin of tegmen narrower; dorsal structures mostly not reaching apex of tegmen (except in <i>Psl. wernermohrigi</i> ) | 34                                   |
| 34. Margin of tegmen narrowly sclerotized; gonostylus apically tapered   | <i>Psl. subtilitegmena</i> sp. n.    |
| - Margin of tegmen broadly sclerotized; gonostylus apically not tapered  | 35                                   |
| 35. Ejaculatory apodeme long (Fig. 50); sclerotized edge of tegmen apically closed   | <i>Psl. wernermohrigi</i> sp. n.     |
| - Ejaculatory apodeme short (e.g. Fig. 51); sclerotized edge of tegmen apically closed or interrupted  | 36                                   |
| 36. Base of ejaculatory apodeme v-shaped; ratio $R_1/R$ mostly greater than 0.65   | <i>Psl. gonotegmena</i> sp. n.       |
| - Base of ejaculatory apodeme u-shaped; ratio $R_1/R$ less than 0.65   | 37                                   |
| 37. Gonostylus more than 3.0 times as long as broad; sclerotized edge of tegmen apically interrupted; ratio $R_1/R$ less than 0.55                                       | <i>Psl. plicitegmena</i> sp. n.      |
| - Gonostylus less than 3.0 times as long as broad; sclerotized edge of tegmen apically closed; ratio $R_1/R$ greater than 0.55   | <i>Psl. huttoni</i> sp. n.           |

TABLE 1. List of primers used for PCR.

| Locus | Primer        | Direction<br>F/R (i) | Primer sequence (5' to 3')   | Annealing temperature | PCR cycles | Reference   |
|-------|---------------|----------------------|------------------------------|-----------------------|------------|---|
| COI   | LCO_1490      | F                    | GGTCAACAAATCATAAAAGATATTGG   | 49°C                  | 38         | Folmer <i>et al.</i> (1994)                               |
| COI   | HCO_2198      | R                    | TAAAACCTTCAGGGTGACCAAAAAATCA | 49°C                  | 38         | Folmer <i>et al.</i> (1994)                               |
| COI   | LepF1         | F                    | ATTCAACCAATCATAAAAGATATTGG   | 49°C                  | 38         | Hebert <i>et al.</i> (2004)                               |
| COI   | LepR1         | R                    | TAAAACCTTCAGGGTGACCAAAAAATCA | 49°C                  | 38         | Hebert <i>et al.</i> (2004)                               |
| COI   | sym-C1-J-1718 | F (i)                | GGAGGATTGGAAAYTGAYTAGTWCC    | 49°C                  | 38         | Simon <i>et al.</i> (1994)                                |
| COI   | C1-N1760      | R (i)                | GGTARAATCARAATCTTATATTAT     | 49°C                  | 38         | Prous <i>et al.</i> (2011)                                |
| 16S   | 16SAR-L       | F                    | CGCCTGTTATCAAAAAACAT         | 49°C                  | 38         | Palumbi <i>et al.</i> (1991)                              |
| 16S   | 16SBR-H       | R                    | CCGGTCTGAACCTCAGATCACGT      | 49°C                  | 38         | Palumbi <i>et al.</i> (1991)                              |
| 16S   | Psl_16S_for   | F (i)                | GTACAAAGGTAGCATAATCRTT       | 53°C                  | 38         | present study   |
| 16S   | Psl_16S_rev   | R (i)                | AATCCAAMATSGAGGTCGCAA        | 53°C                  | 38         | present study   |
| 28S   | 28S_A         | F                    | GACCCGTCTTGAAACACGGA         | 49°C                  | 40         | Whiting <i>et al.</i> (1997)                              |
| 28S   | 28S-rD7b1     | R                    | GACTTCCCTTACCTACAT           | 49°C                  | 40         | Friedrich & Tautz (1997);<br>Whiting <i>et al.</i> (1997) |
| 28S   | 28S-Rd48a     | F (i)                | ACCTATTCTCAAACCTTAAATGG      | 49°C                  | 40         | Whiting <i>et al.</i> (1997)                              |
| 28S   | 28S-rD5b      | R (i)                | CCACAGGGCAGTTCTGCTTAC        | 49°C                  | 40         | Whiting <i>et al.</i> (1997)                              |
| 28S   | 28SF2         | F                    | CACGAGCCGATAGCGAACAAAG       | 54°C                  | 40         | Boevé <i>et al.</i> (2013)                                |
| 28S   | 28SB2         | R                    | CCAAGGCCTCTAATCATTCGC        | 54°C                  | 40         | Boevé <i>et al.</i> (2013)                                |

**TABLE 2.** List of sequenced specimens used in this study with GenBank accession numbers or BOLD link.

| Species                          | Family        | Country     | Sample number     | GenBank Accession Number |          |                             | Reference                 |
|----------------------------------|---------------|-------------|-------------------|--------------------------|----------|-----------------------------|---------------------------|
|                                  |               |             |                   | COI                      | 16S      | 28S                         |                           |
| <i>Diadocidia ferruginea</i>     | Diadocidiidae | Slovakia    | SJ1               | KC4355634                | KC435598 | Ševčík <i>et al.</i> (2013) |                           |
| <i>Diadocidia spinosula</i>      | Diadocidiidae | Slovakia    | JSSJ7             | KJ136800                 | KJ136773 | Ševčík <i>et al.</i> (2014) |                           |
| <i>Coboldia</i> sp.              | Scatopsidae   | China       | 905               | JQ613854                 | JQ613758 | Shin <i>et al.</i> (2013)   |                           |
| <i>Corynoptera</i> sp. bs9       | Sciaridae     | New Zealand | SDEI-Dipt-0000853 | MK906346                 | MK906528 |                             |                           |
| <i>Ctenosciara etorata</i>       | Sciaridae     | New Zealand | SDEI-Dipt-0001305 | MK906386                 | MK906481 |                             |                           |
| <i>Pseudolycoriella aotearoa</i> | Sciaridae     | New Zealand | SDEI-Dipt-0000997 | MK906359                 | MK906451 |                             |                           |
| <i>PsL. bispina</i>              | Sciaridae     | New Zealand | SDEI-Dipt-0000946 | MK906352                 | MK906444 | MK906534                    |                           |
| <i>PsL. bispina</i>              | Sciaridae     | New Zealand | SDEI-Dipt-0000974 | MK906355                 | MK906447 | MK906537                    |                           |
| <i>PsL. bispina</i>              | Sciaridae     | New Zealand | SDEI-Dipt-0001251 | MK906384                 | MK906479 | MK906569                    |                           |
| <i>PsL. bispina</i>              | Sciaridae     | New Zealand | SDEI-Dipt-0001518 | MK906399                 | MK906497 | MK906587                    |                           |
| <i>PsL. bispina</i>              | Sciaridae     | New Zealand | SDEI-Dipt-0001522 | MK906401                 | MK906499 | MK906589                    |                           |
| <i>PsL. cavatica</i>             | Sciaridae     | New Zealand | SDEI-Dipt-0001085 | MK906405                 | MK906455 | MK906545                    |                           |
| <i>PsL. cavatica</i>             | Sciaridae     | New Zealand | SDEI-Dipt-0001411 | MK906395                 | MK906490 | MK906580                    |                           |
| <i>PsL. daga</i>                 | Sciaridae     | New Zealand | SDEI-Dipt-0000628 | MK906330                 | MK906421 | MK906511                    |                           |
| <i>PsL. daga</i>                 | Sciaridae     | New Zealand | SDEI-Dipt-0000655 | MK906331                 | MK906422 | MK906512                    |                           |
| <i>PsL. frederickedwardsi</i>    | Sciaridae     | New Zealand | SDEI-Dipt-0000756 | MK906339                 | MK906431 | MK906521                    |                           |
| <i>PsL. frederickedwardsi</i>    | Sciaridae     | New Zealand | SDEI-Dipt-0000772 | MK906341                 | MK906433 | MK906523                    |                           |
| <i>PsL. frederickedwardsi</i>    | Sciaridae     | New Zealand | SDEI-Dipt-0001224 | MK906374                 | MK906468 | MK906558                    |                           |
| <i>PsL. frederickedwardsi</i>    | Sciaridae     | New Zealand | SDEI-Dipt-0001237 | MK906379                 | MK906474 | MK906564                    |                           |
| <i>PsL. frederickedwardsi</i>    | Sciaridae     | New Zealand | SDEI-Dipt-0001247 | MK906382                 | MK906477 | MK906567                    |                           |
| <i>PsL. gonogramma</i>           | Sciaridae     | New Zealand | SDEI-Dipt-0000977 | MK906356                 | MK906448 | MK906538                    |                           |
| <i>PsL. hauta</i>                | Sciaridae     | New Zealand | SDEI-Dipt-0000506 | MK906322                 | MK906412 | MK906502                    |                           |
| <i>PsL. horribilis</i>           | Sciaridae     | Korea       | 074               | JQ613788                 | JQ613887 | JQ613691                    | Shin <i>et al.</i> (2013) |
| <i>PsL. huttoni</i>              | Sciaridae     | New Zealand | SDEI-Dipt-0000621 | MK906327                 | MK906418 | MK906508                    |                           |
| <i>PsL. jaschhofi</i>            | Sciaridae     | New Zealand | SDEI-Dipt-0001511 | MK906409                 | MK906494 | MK906584                    |                           |
| <i>PsL. jaschhofi</i>            | Sciaridae     | New Zealand | SDEI-Dipt-0001513 | MK906410                 | MK906495 | MK906585                    |                           |
| <i>PsL. jaschhofi</i>            | Sciaridae     | New Zealand | SDEI-Dipt-0001514 | MK906398                 | MK906496 | MK906586                    |                           |

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TABLE 2. (Continued)

| Species                    | Family    | Country     | Sample number     | GenBank Accession Number |          |          | Reference |
|----------------------------|-----------|-------------|-------------------|--------------------------|----------|----------|-----------|
|                            |           |             |                   | COI                      | 16S      | 28S      |           |
| <i>Psl. jejuna</i>         | Sciaridae | New Zealand | SDEI-Dipt-0000603 | MK906326                 | MK906416 | MK906506 |           |
| <i>Psl. jejuna</i>         | Sciaridae | New Zealand | SDEI-Dipt-0000617 | MK906403                 | MK906417 | MK906507 |           |
| <i>Psl. jejuna</i>         | Sciaridae | New Zealand | SDEI-Dipt-0000744 | MK906404                 | MK906428 | MK906518 |           |
| <i>Psl. jejuna</i>         | Sciaridae | New Zealand | SDEI-Dipt-0000773 | MK906342                 | MK906344 | MK906524 |           |
| <i>Psl. jejuna</i>         | Sciaridae | New Zealand | SDEI-Dipt-0000829 | MK906344                 | MK906436 | MK906526 |           |
| <i>Psl. jejuna</i>         | Sciaridae | New Zealand | SDEI-Dipt-0001193 | MK906371                 | MK906464 | MK906554 |           |
| <i>Psl. jejuna</i>         | Sciaridae | New Zealand | SDEI-Dipt-0001195 | MK906406                 | MK906466 | MK906556 |           |
| <i>Psl. jejuna</i>         | Sciaridae | New Zealand | SDEI-Dipt-0001339 | MK906390                 | MK906485 | MK906575 |           |
| <i>Psl. jejuna</i>         | Sciaridae | New Zealand | SDEI-Dipt-0001347 | MK906391                 | MK906486 | MK906576 |           |
| <i>Psl. jejuna</i>         | Sciaridae | New Zealand | SDEI-Dipt-0000935 | MK906351                 | MK906443 | MK906533 |           |
| <i>Psl. kaikoura</i>       | Sciaridae | New Zealand | SDEI-Dipt-0000500 | MK906321                 | MK906411 | MK906501 |           |
| <i>Psl. macrotegmena</i>   | Sciaridae | New Zealand | SDEI-Dipt-0000757 | MK906340                 | MK906432 | MK906522 |           |
| <i>Psl. maddisoni</i>      | Sciaridae | New Zealand | SDEI-Dipt-0000627 | MK906329                 | MK906420 | MK906510 |           |
| <i>Psl. maddisoni</i>      | Sciaridae | New Zealand | SDEI-Dipt-0000664 | MK906332                 | MK906423 | MK906513 |           |
| <i>Psl. maddisoni</i>      | Sciaridae | New Zealand | SDEI-Dipt-0000595 | MK906324                 | MK906414 | MK906504 |           |
| <i>Psl. mahanga</i>        | Sciaridae | New Zealand | SDEI-Dipt-0001008 | MK906362                 | MK906454 | MK906544 |           |
| <i>Psl. orite</i>          | Sciaridae | New Zealand | SDEI-Dipt-0000863 | MK906347                 | MK906439 | MK906529 |           |
| <i>Psl. plictegmena</i>    | Sciaridae | New Zealand | SDEI-Dipt-0001153 | MK906366                 | MK906459 | MK906549 |           |
| <i>Psl. plictegmena</i>    | Sciaridae | New Zealand | SDEI-Dipt-0001158 | MK906367                 | MK906460 | MK906550 |           |
| <i>Psl. porotaka</i>       | Sciaridae | New Zealand | SDEI-Dipt-0001225 | MK906375                 | MK906469 | MK906559 |           |
| <i>Psl. porotaka</i>       | Sciaridae | New Zealand | SDEI-Dipt-0001250 | MK906383                 | MK906478 | MK906568 |           |
| <i>Psl. puhihi</i>         | Sciaridae | New Zealand | SDEI-Dipt-0001005 | MK906361                 | MK906453 | MK906543 |           |
| <i>Psl. puhihi</i>         | Sciaridae | New Zealand | SDEI-Dipt-0001422 | MK906396                 | MK906491 | MK906581 |           |
| <i>Psl. raki</i>           | Sciaridae | New Zealand | SDEI-Dipt-0000834 | MK906345                 | MK906437 | MK906527 |           |
| <i>Psl. robustotegmena</i> | Sciaridae | New Zealand | SDEI-Dipt-0001358 | MK906392                 | MK906487 | MK906577 |           |
| <i>Psl. robustotegmena</i> | Sciaridae | New Zealand | SDEI-Dipt-0001371 | MK906393                 | MK906488 | MK906578 |           |

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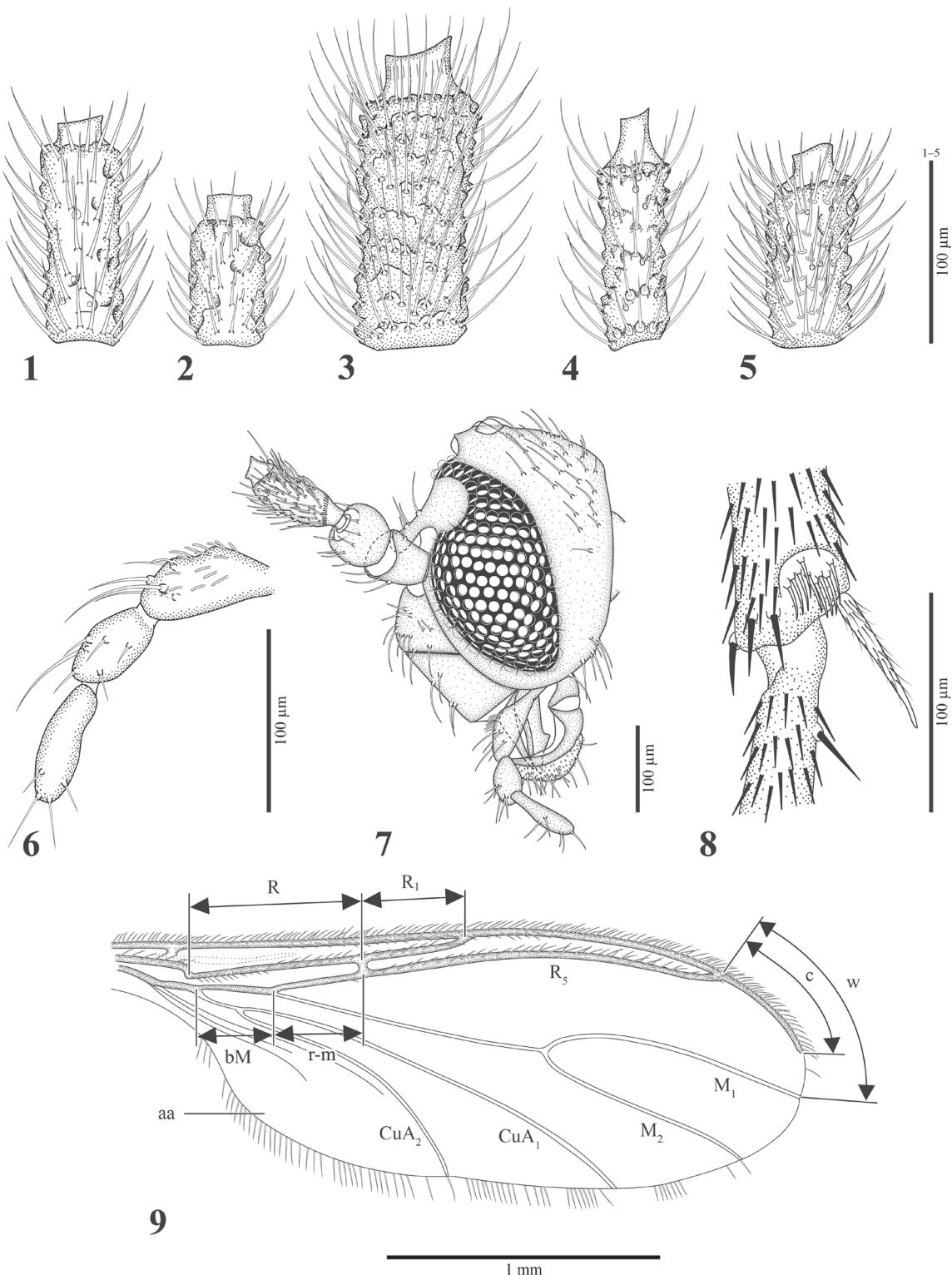
TABLE 2. (Continued)

| Species                    | Family    | Country     | Sample number     | GenBank Accession Number |          |          | Reference                 |
|----------------------------|-----------|-------------|-------------------|--------------------------|----------|----------|---------------------------|
|                            |           |             |                   | COI                      | 16S      | 28S      |                           |
| <i>Psl. sp. 1</i> SS-2012  | Sciaridae | Korea       | 586               | JQ613816                 | JQ613916 | JQ613720 | Shin <i>et al.</i> (2013) |
| <i>Psl. sp. 2</i> SS-2012  | Sciaridae | Korea       | 640               | JQ613823                 | JQ613923 | JQ613727 | Shin <i>et al.</i> (2013) |
| <i>Psl. sp. I</i>          | Sciaridae | New Zealand | BIOUG14863-H041   | see BOLD (2019b)         | n/a      | n/a      | BOLD (2019b)              |
| <i>Psl. sp. I</i>          | Sciaridae | New Zealand | BIOUG15289-H10    | see BOLD (2019b)         | n/a      | n/a      | BOLD (2019b)              |
| <i>Psl. sp. I</i>          | Sciaridae | New Zealand | BIOUG15552-D06    | see BOLD (2019b)         | n/a      | n/a      | BOLD (2019b)              |
| <i>Psl. sp. I</i>          | Sciaridae | New Zealand | BIOUG15560-H06    | see BOLD (2019b)         | n/a      | n/a      | BOLD (2019b)              |
| <i>Psl. sp. II</i>         | Sciaridae | New Zealand | SDEI-Dipt-0000745 | MK906337                 | MK906429 | MK906519 |                           |
| <i>Psl. sp. SS-2012</i>    | Sciaridae | China       | 084               | JQ613789                 | JQ613888 | JQ613692 | Shin <i>et al.</i> (2013) |
| <i>Psl. subtilegimenta</i> | Sciaridae | New Zealand | SDEI-Dipt-0001151 | MK906364                 | MK906457 | MK906547 |                           |
| <i>Psl. sudhausi</i>       | Sciaridae | New Zealand | SDEI-Dipt-0000885 | MK906348                 | MK906440 | MK906530 |                           |
| <i>Psl. sudhausi</i>       | Sciaridae | New Zealand | SDEI-Dipt-0001167 | MK906368                 | MK906461 | MK906551 |                           |
| <i>Psl. sudhausi</i>       | Sciaridae | New Zealand | SDEI-Dipt-0001170 | MK906369                 | MK906462 | MK906552 |                           |
| <i>Psl. sudhausi</i>       | Sciaridae | New Zealand | SDEI-Dipt-0001175 | MK906370                 | MK906463 | MK906553 |                           |
| <i>Psl. sudhausi</i>       | Sciaridae | New Zealand | SDEI-Dipt-0001459 | MK906397                 | MK906493 | MK906583 |                           |
| <i>Psl. teo</i>            | Sciaridae | New Zealand | SDEI-Dipt-0001528 | MK906402                 | MK906500 | MK906590 |                           |
| <i>Psl. tewaipouamu</i>    | Sciaridae | New Zealand | SDEI-Dipt-0000513 | MK906323                 | MK906413 | MK906503 |                           |
| <i>Psl. tewaipouamu</i>    | Sciaridae | New Zealand | SDEI-Dipt-0000752 | MK906338                 | MK906430 | MK906520 |                           |
| <i>Psl. tewaipouamu</i>    | Sciaridae | New Zealand | SDEI-Dipt-0000907 | MK906350                 | MK906442 | MK906532 |                           |
| <i>Psl. tewaipouamu</i>    | Sciaridae | New Zealand | SDEI-Dipt-0000956 | MK906353                 | MK906445 | MK906535 |                           |
| <i>Psl. tewaipouamu</i>    | Sciaridae | New Zealand | SDEI-Dipt-0000960 | MK906354                 | MK906446 | MK906536 |                           |
| <i>Psl. tewaipouamu</i>    | Sciaridae | New Zealand | SDEI-Dipt-0000994 | MK906358                 | MK906450 | MK906540 |                           |
| <i>Psl. tonnoiri</i>       | Sciaridae | New Zealand | SDEI-Dipt-0000597 | MK906325                 | MK906415 | MK906505 |                           |
| <i>Psl. tonnoiri</i>       | Sciaridae | New Zealand | SDEI-Dipt-0000980 | MK906357                 | MK906449 | MK906539 |                           |
| <i>Psl. tonnoiri</i>       | Sciaridae | New Zealand | SDEI-Dipt-0001140 | MK906363                 | MK906456 | MK906546 |                           |
| <i>Psl. tonnoiri</i>       | Sciaridae | New Zealand | SDEI-Dipt-0001152 | MK906365                 | MK906458 | MK906548 |                           |
| <i>Psl. tuakana</i>        | Sciaridae | New Zealand | SDEI-Dipt-0001194 | MK906372                 | MK906465 | MK906555 |                           |

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TABLE 2. (Continued)

| Species                       | Family    | Country     | Sample number     | GenBank Accession Number |          |          | Reference |
|-------------------------------|-----------|-------------|-------------------|--------------------------|----------|----------|-----------|
|                               |           |             |                   | COI                      | 16S      | 28S      |           |
| <i>Psl. tuakana</i>           | Sciaridae | New Zealand | SDEI-Dipt-0001337 | MK906389                 | MK906484 | MK906574 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0000665 | MK906333                 | MK906424 | MK906514 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0000670 | MK906334                 | MK906425 | MK906515 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0000674 | MK906335                 | MK906426 | MK906516 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0001223 | MK906373                 | MK906467 | MK906557 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0001227 | MK906376                 | MK906470 | MK906560 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0001234 | MK906378                 | MK906472 | MK906562 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0001235 | MK906407                 | MK906473 | MK906563 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0001238 | MK906380                 | MK906475 | MK906565 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0001245 | MK906381                 | MK906476 | MK906566 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0001270 | MK906385                 | MK906480 | MK906570 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0001334 | MK906387                 | MK906482 | MK906572 |           |
| <i>Psl. wernermohrigi</i>     | Sciaridae | New Zealand | SDEI-Dipt-0001373 | MK906394                 | MK906489 | MK906579 |           |
| <i>Psl. cf. wernermohrigi</i> | Sciaridae | New Zealand | SDEI-Dipt-0000681 | MK906336                 | MK906427 | MK906517 |           |
| <i>Psl. cf. wernermohrigi</i> | Sciaridae | New Zealand | SDEI-Dipt-0001232 | MK906377                 | MK906471 | MK906561 |           |
| <i>Psl. whakahara</i>         | Sciaridae | New Zealand | SDEI-Dipt-0001439 | MK906408                 | MK906492 | MK906582 |           |
| <i>Psl. whena</i>             | Sciaridae | New Zealand | SDEI-Dipt-0001336 | MK906388                 | MK906483 | MK906573 |           |
| <i>Psl. zealandica</i>        | Sciaridae | New Zealand | SDEI-Dipt-0000623 | MK906328                 | MK906419 | MK906509 |           |
| <i>Psl. zealandica</i>        | Sciaridae | New Zealand | SDEI-Dipt-0000886 | MK906349                 | MK906441 | MK906531 |           |
| <i>Psl. zealandica</i>        | Sciaridae | New Zealand | SDEI-Dipt-0000998 | MK906360                 | MK906452 | MK906542 |           |
| <i>Zygoneura contractans</i>  | Sciaridae | New Zealand | SDEI-Dipt-0000826 | MK906343                 | MK906435 | MK906525 |           |



**FIGURES 1–9.** Various body parts of *Pseudolycoriella* spp., in lateral view. 1. *Pseudolycoriella dagae* sp. n., fourth flagellomere. 2. *Pseudolycoriella jejunella* sp. n., fourth flagellomere. 3. *Pseudolycoriella aotearoa* sp. n., fourth flagellomere. 4. *Pseudolycoriella bispina* Mohrig, fourth flagellomere. 5. *Pseudolycoriella puhihi* sp. n., fourth flagellomere. 6. *Pseudolycoriella jejunella* sp. n., palp. 7. *Pseudolycoriella robustotegmenta* sp. n., head. 8. *Pseudolycoriella jejunella* sp. n., tibial organ. 9. *Pseudolycoriella hauta* sp. n., wing. Abbreviations: aa = anal area; bM = base of the medial vein; c = distance between intersection of vein R<sub>5</sub> and radial vein and the end of costal vein; CuA<sub>1</sub>/CuA<sub>2</sub> = first and second branch of the anterior branch of the cubital vein; M<sub>1</sub>/M<sub>2</sub> = first and second branch of the medial vein (“M-fork”); R = radial vein; R<sub>1</sub>/R<sub>5</sub> = first and fifth branch of the radial vein; r-m = crossvein between radial and median veins; w = distance between intersection of vein M<sub>1</sub> and wing margin and intersection of vein R<sub>5</sub> and radial vein.

## Species account

### *Pseudolycoriella cavatica* (Skuse, 1888)

(Fig. 10)

#### Synonyms.

*Sciara familiaris* Skuse, 1888

*Sciara festiva* Skuse, 1888

*Spathobdella setigera* Hardy, 1960 **syn. n.**

**Literature.** *Sciara cavatica* Skuse, 1888; *S. familiaris* Skuse, 1888 & *S. festiva* Skuse, 1888: Skuse (1888): 687–690.—*Pseudolycoriella cavatica* (Skuse, 1888): Broadley *et al.* (2016): 437, 439–441, Fig. 23 A–D & Fig. 24 A–B.—*Spathobdella setigera* Hardy, 1960: Hardy (1960): 234, Fig. 80 a–c.—*Bradyzia setigera* (Hardy, 1960): Steffan (1973): 356.—Leblanc *et al.* (2009): 1455.—*Pseudolycoriella setigera* (Hardy, 1960): Menzel & Heller (2007): 223.—Menzel & Smith (2009): 41–43, Figs 1.45–47.—Köhler & Menzel (2013): 69.—Menzel *et al.* (2013): 292–293, Figs 22–23.—Menzel & Smith (2017): 21, Fig. 82.—Mohrig *et al.* (2019): 426–427, Fig. 17 A–E.—Sciaridae indet.: BOLD (2019a).

**Material studied.** 1♂ New Zealand: North Island, Auckland, Manurewa, Mill Road, pitfall trap, 03–13.02.2015, leg. P.A. Maddison (SDEI, SDEI-Dipt-0001281). 2♂♂ same locality as previous, 14–27.02.2015 (NZAC, SDEI-Dipt-0001283; SDEI, SDEI-Dipt-0001255). 9♂♂ North Island, Western Bay of Plenty, Katikati, 140 Wharawhara Road, bush area, pitfall trap, 14.02–05.03.2015, leg. P.A. Maddison (4x NZAC; 5x SDEI, SDEI-Dipt-0001411). 1♂ same locality as previous, 14.02–05.03.2015, Malaise trap, leg. P.A. Maddison (NZAC, SDEI-Dipt-0001085). 2♀♀ North Island, Western Bay of Plenty, Katikati, 140 Wharawhara Road, kiwifruit block, Malaise trap, 14.02–05.03.2015, leg. P.A. Maddison (all SDEI, SDEI-Dipt-0001443 & SDEI-Dipt-0001458). 3♂♂ North Island, Western Bay of Plenty, Katikati, Te Mania catchment, Malaise trap, 19.09–27.10.2016, leg. P.A. Maddison (1x NZAC, SDEI-Dipt-0001231; 2x SDEI, SDEI-Dipt-0001229 & SDEI-Dipt-0001368). 1♂ North Island, Western Bay of Plenty, Katikati, Uretara, mangrove area, Malaise trap, 04.09–22.10.2016, leg. P.A. Maddison (SDEI, SDEI-Dipt-0001377). 2♀♀ North Island, Western Bay of Plenty, Katikati, 17 Francis Drive, Malaise trap, 14.02–05.03.2015, leg. P.A. Maddison (NZAC, SDEI-Dipt-0001298; SDEI, SDEI-Dipt-0001297). 2♂♂ South Island, Buller, Ahaura, Granville State Forest, altitude 170–250 m, *Nothofagus truncata* forest, Malaise trap, 01.12.1994, leg. J. Hutcheson (all SDEI). 1♂ South Island, Christchurch, Halswell quarry, light trap and pan trap, 26.02.2004, leg. R.P. Macfarlane (UZMH).

**Description.** See Menzel & Smith (2009) and Broadley *et al.* (2016).

**Genetic distances.** All 16 investigated COI sequences are identical and do not show any pairwise distance. Among the New Zealand species, the nearest neighbour is *Pseudolycoriella teo*, diverging by a minimum of 8.85%. No differences between two conspecific 28S sequences were found. The nearest neighbours are *Psl. horribilis* and an undescribed species from Korea (*Psl. sp. 1 SS-2012*). Both p-distances are 0.75%.

**Distribution.** Australia (New South Wales and Western Australia [BOLD 2019a]); Hawaii, New Caledonia, Seychelles, Tristan da Cunha, and South Africa (BOLD 2019a). New to New Zealand.

**Remarks.** The COI-barcode of *Psl. cavatica* is also recorded on the Barcode of Life Data System (BOLD 2019a). There it is listed under the BIN BOLD:ABW3602. All these new records fit well into the already known distribution pattern of this species, which comprises Australia and islands south of the Tropic of Cancer. The frequent occurrence of *Psl. cavatica* in pitfall traps suggests an epigean ecology as already noted by Menzel & Smith (2009).

### *Pseudolycoriella kaikoura* sp. n.

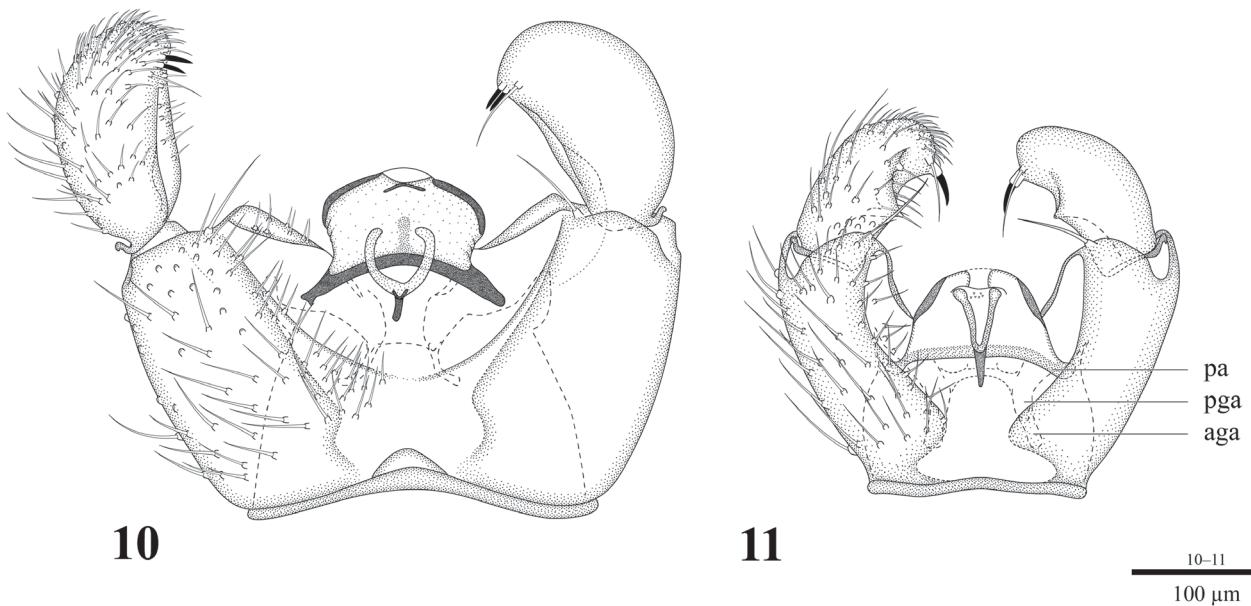
(Fig. 11)

urn:lsid:zoobank.org:act:F587D109-BD83-490F-921F-E515D4356B80

**Material studied.** *Holotype male.* New Zealand, South Island, Kaikoura, Waiau, Pillona, altitude 400 m, *Kunzea ericoides* over water supply seepage, Malaise trap, 26.12.2000–12.01.2001, leg. P.M. Johns (NZAC, SDEI-Dipt-0000500). *Paratype.* 1♂ same locality and same date as holotype (SDEI, SDEI-Dipt-0000501).

**Description. Male. Head.** Head capsule brown. Eye bridge two to three facets wide. Antennae light brown,

without any contrast between scape, pedicel and flagellum; fourth flagellomere 1.8–1.9 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough with deep pits, sensilla of two different lengths; setae on the flagellomere as long as flagellomere width. Maxillary palp pale with three palpomeres, first one longest, second and third short and of same length, first palpomere with two to four bristles; patch of sensilla on first palpomere not conspicuous. Prefrons and clypeus bulging. **Thorax** pale brown. Posterior pronotum bare. Anterior pronotum with three to five setae. Episternum 1 with four to seven setae. Mesonotum with three long lateral bristles and several small ones. Scutellum with four robust bristles and several smaller setae. Katepisternum as long as high, distal part slightly darker than proximal part. **Wing.** Length 2.0 mm; width/length ratio 0.35. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct; r-m and bM without macrotrichia; R<sub>5</sub> with macrotrichia on dorsal side only (the paratype bears two additional macrotrichia at ventral side of R<sub>5</sub> apex); R<sub>1</sub> approximately 0.7–0.8 times as long as R; c/w ratio 0.7; r-m as long as bM. Haltere brownish; with a short shaft; head of haltere longer than shaft. **Legs** yellowish brown. Tibial organ surrounded by a circular border and as wide as half width of tibial apex; bristles of tibial organ arranged in an irregular row. Front tibia with one robust bristle among vestiture. Mid tibia with one slightly robust bristle. Hind tibia with a posteriodorsal row of eight robust bristles, comprising apical two-thirds of tibia, additional robust bristles on the ventral and posterior sides. All tibial spurs equal in length. Claws with teeth. **Abdomen** pale brown, slightly paler than thorax. **Hypopygium** (Fig. 11). Gonocoxites wider than long, inner side of gonocoxites with short setae, outer side with long hairs; ventral, inner side of gonocoxites v-shaped and basally widely separated; apicolaterally strongly incised. Gonostylus two times longer than wide; with a prominent edge in the middle of the inner side, one spine and one long whip-lash hair subapically, apex with a dense vestiture of robust setae. Tegmen apical roundish, lateral parts sclerotized; parameral apodeme very robust. Area of teeth with approximately ten tiny teeth. Ejaculatory apodeme short and dark; base distinct, v-shaped. Posterior portion of gonocoxal apodeme long, brown, widely separated, and medially connected. Anterior portion of gonocoxal apodeme long and dark brown.



**FIGURES 10–11.** *Pseudolycoriella bruckii* group, hypopygia. **10.** *Pseudolycoriella cavatica* (Skuse). **11.** *Pseudolycoriella kaikoura* sp. n. Abbreviations: aga = anterior portion of gonocoxal apodeme; pa = parameral apodeme; pga = posterior portion of gonocoxal apodeme.

*Body size:* 2.0 mm.

*Female.* Unknown.

**Genetic distances.** Only one specimen was successfully sequenced. The nearest neighbour is *Psl.* sp. I, diverging by a minimum of 4.86%. For the 28S sequence the nearest neighbour is *Psl. horribilis*, diverging by a minimum of 0.25%.

**Etymology.** The newly described species is named after the Kaikoura peninsula, where both specimens were caught.

**Distribution.** New Zealand.

**Discussion.** The reduction to one gonostylar spine—as in this new species—is an infrequent character state among the species of *Pseudolycoriella*. Outside of New Zealand only a few species are known to have such a reduction: *Pseudolycoriella curviseta* Mohrig, *Psl. defluviata* Rudzinski, *Psl. japonensis* (Mohrig & Menzel), *Psl. patronata* Rudzinski, *Psl. pollicis* (Pettey) [for this species Mohrig *et al.* (2013) stated two narrow subequal spines, while Mohrig & Kauschke (2019) only gave one spine], *Psl. pugionata* Rudzinski, *Psl. microctenium* (Yang & Zhang), *Psl. morenae* (Strobl), *Psl. pendleburyi* (Edwards), *Psl. semialata* (Edwards), and *Psl. subbruckii* (Mohrig & Hövemeyer). None of these species has a prominent edge in the middle of the inner side of the gonostylus. Therefore, confusion with *Psl. kaikoura* can be excluded. Among the New Zealand representatives of the genus the species of the *Psl. jejuna* complex also bear only one spine on the gonostylus. Nevertheless, *Psl. kaikoura* can easily be distinguished from them by its uniquely shaped gonostylus and its different tegmen structure. *Pseudolycoriella kaikoura* can be assigned to the *Psl. bruckii* group.

### *Pseudolycoriella* sp. I

**Literature.** *Pseudolycoriella* indet.: BOLD (2019b).

**Barcoded material.** 1♀ New Zealand: North Island, Waikato, Hamilton, altitude 39 m, Malaise trap, 05.06.2012, leg. I. Hogg (CBG, BIOUG14863-H041). 1♀ same locality as previous, Malaise trap, 19.11.2012, leg. I. Hogg (CBG, BIOUG15289-H10). 1♀ same locality as previous, Malaise trap, 11.03.2013, leg. I. Hogg (CBG, BIOUG15552-D06). 1♀ same locality as previous, Malaise trap, 08.04.2013, leg. I. Hogg (CBG, BIOUG15560-H06).

**Genetic distances.** The maximum p-distance between all four available COI sequences is 0.17%. The nearest neighbour is *Psl. kaikoura*, diverging by a minimum of 4.86%. No 28S sequence data are available.

**Discussion.** The COI barcodes of *Psl. sp. I* are registered on the Barcode of Life Data System under the BIN: BOLD:ACP1302 (BOLD 2019b). The p-distance of 4.86% towards the nearest neighbour suggests the existence of a further unknown species. Nevertheless, it was judged premature to prepare a formal description because no males are available and the lack of knowledge about the taxonomy of the females of *Pseudolycoriella* does not allow solid conclusions to be made on species delimitation.

### *Pseudolycoriella zealandica* complex

The *Pseudolycoriella zealandica* complex consists of probably three species—*Pseudolycoriella zealandica*, *Psl. aotearoa*, and the undescribed *Psl. sp. II*. Individuals have a relatively large body, and thus the largest New Zealand *Pseudolycoriella* specimens can be found in this complex. The males of the described species are characterized by two gonostylar spines, and the trapezoid tegmen with a broad hood-like structure (*hs* in Fig. 12). Their phylogenetic relationship is shown in Figure 61.

**Discussion.** The *Psl. zealandica* complex can be assigned to the *Psl. bruckii* group without any contradictions. It is not possible to state which morphological characters might be regarded as autapomorphies of this complex, because the undescribed species is located basally in the clade of the *Psl. zealandica* complex. Therefore, conclusions about the ground plan of the *Psl. zealandica* complex are not possible. It can only be stated that this complex comprises the largest species of *Pseudolycoriella* in New Zealand. Nevertheless, the monophyly is clearly indicated by genetic data.

### *Pseudolycoriella zealandica* (Edwards, 1927)

(Fig. 12)

**Literature.** *Sciara zealandica* Edwards, 1927: Tonnoir & Edwards (1927): 796, Fig. 180.—Miller (1950): 57.—Davies (1988): 13.—Steffan (1989): 151.—*Pseudolycoriella zealandica* (Edwards, 1927): Mohrig & Jaschhof (1999): 37, Fig. 18 a–g.—Menzel & Mohrig (2000): 715–716.—Rudzinski (2000): 183.—Macfarlane *et al.* (2010): 441

**Material studied.** *Holotype male.* New Zealand: North Island, Waikato, Okauia, Matamata, 18.11.1922, leg. A.E.

Brookes (BMNH, BMNH(E)250341). Previously published material: 7♂♂ North Island, Taupo, Hauhungaroa Range, 5 km southwest of Tihoi, *Podocarpus* wood with ground ferns, sweep net, 21.12.1992, leg. M. Jaschhof (6x PWMP; 1x SDEI). New records: 22♂♂ North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, 690 m, mixed podocarp/broadleaf forest, Malaise trap, 26.11–28.12.2002, leg. M. & C. Jaschhof & U. Kallweit (7x NZAC, SDEI-Dipt-0000622, SDEI-Dipt-0000624, SDEI-Dipt-0000998, SDEI-Dipt-0001002, SDEI-Dipt-0001243 & SDEI-Dipt-0001246; 15x SDEI, SDEI-Dipt-0000623, SDEI-Dipt-0001001, SDEI-Dipt-0001239, SDEI-Dipt-0001242, SDEI-Dipt-0001244, SDEI-Dipt-0001248, SDEI-Dipt-0001254, SDEI-Dipt-0001538, SDEI-Dipt-0001539, SDEI-Dipt-0001540, SDEI-Dipt-0001541 & SDEI-Dipt-0001542). 1♀ same locality as previous, sweep net, 03–04.02.2002, leg. M. Jaschhof (SDEI, SDEI-Dipt-0000783). 9♂♂, 2♀♀ South Island, Selwyn, Cass, Middle Bush, *Nothofagus solandri* forest, stream site, Malaise trap, 09.04.1998, leg. P.M. Johns (4x NZAC, SDEI-Dipt-0001166, SDEI-Dipt-0001176, SDEI-Dipt-0001186 & SDEI-Dipt-0001189; 7x SDEI, SDEI-Dipt-0001168, SDEI-Dipt-0001183 [♀], SDEI-Dipt-0001185, SDEI-Dipt-0001187, SDEI-Dipt-0001188, SDEI-Dipt-0001190 & SDEI-Dipt-0001191 [♀]). 1♂, 1♀ same locality as previous, 11.04.1998, leg. P.M. Johns (all SDEI, SDEI-Dipt-0001163 [♂] & SDEI-Dipt-0001162 [♀]). 21♂♂ South Island, Southland, Fiordland, Fiordland NP, Hollyford River Valley, Moraine Creek Track, mixed podocarp/*Nothofagus* forest, Malaise trap, 05–24.01.2002, leg. M. & C. Jaschhof (8x NZAC, SDEI-Dipt-0000883, SDEI-Dipt-0001544, SDEI-Dipt-0001546, SDEI-Dipt-0001548, SDEI-Dipt-0001551, SDEI-Dipt-0001554, SDEI-Dipt-0001557 & SDEI-Dipt-0001559; 13x SDEI, SDEI-Dipt-0000882, SDEI-Dipt-0000884, SDEI-Dipt-0000886, SDEI-Dipt-0001543, SDEI-Dipt-0001545, SDEI-Dipt-0001547, SDEI-Dipt-0001549, SDEI-Dipt-0001550, SDEI-Dipt-0001552, SDEI-Dipt-0001553, SDEI-Dipt-0001555, SDEI-Dipt-0001556 & SDEI-Dipt-0001558). 1♂ South Island, Southland, Otago Lakes, Fiordland NP, Hollyford River Valley S Divide Creek, mixed *Nothofagus*/broadleaf forest, Malaise trap, 06–24.01.2002, leg. M. & C. Jaschhof (SDEI).

**Redescription. Male.** Head capsule brown. Eye bridge four facets wide, two to three facets at margin. Scape and pedicel slightly paler than the flagellomeres; fourth flagellomere 2.3–3.2 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough, sensillae of two different lengths, small ones and longer, curved sensilla; setae on the flagellomere dense and as long as flagellomere width, slightly curved. Maxillary palp long and three-segmented, first palpomere longest, second one shortest; first palpomere with an inconspicuous patch of sensilla and five to eight long bristles, one of these bristles longer and more robust, located on the outer side of the first palpomere. Prefrons and clypeus bulging. **Thorax** brown, paler than head; some specimens with small brightened parts anteriorly and posteriorly. Posterior pronotum bare. Anterior pronotum with four to eight setae. Episternum 1 with five to 14 setae. Mesonotum with five to nine robust lateral bristles; row of dorsocentral bristles well developed. Scutellum with five to eight robust bristles and several minor setae. Katepisternum slightly longer than high. **Wing.** Length 2.4–2.9 mm; width/length ratio 0.35–0.39. Membrane smoky and without macrotrichia, anal area present; all posterior veins distinct, stem of M weakest, apical half of  $R_s$  with macrotrichia on ventral and dorsal side;  $r-m$  and  $bM$  bare, exceptionally  $r-m$  with one seta;  $R_1$  0.7–0.9 times as long as  $R$ ; c/w ratio 0.73–0.82;  $r-m$  0.6–1.0 as long as  $bM$ . Haltere short and sooty brown; knob as long as shaft. **Legs** pale, yellowish brown. Tibial organ surrounded by a circular border and wider than half width of tibial apex; tibial organ consists of a transverse row of bristles. Fore and mid tibia without robust bristles among vestiture. Hind tibia with two to seven robust bristles arranged in a longitudinal, posteriodorsal row. All tibial spurs equal in length. Claws with robust teeth, arranged in decreasing size. **Abdomen** brown, slightly paler than thorax, with dark setae. **Hypopygium** (Fig. 12). Gonocoxite wider than long, inner side of gonocoxites with a membranous area scattered with short pale setae, outer side with long setae; ventral, inner side of gonocoxites basally not fused. Gonostylus bean shaped, 2.1–2.8 times longer than wide, apically with a large inner cavity without any microtrichia, two robust spines and one long whip-lash hair present. Tegmen trapezoid with a strongly sclerotized base, parameral apodeme short and robust; medially with a broad hood-like structure ( $hs$  in Fig. 12) laterally flanked by a group of small teeth (not expressed in all specimens, 19 of 30 specimens from the North Island and six of 33 from the South Island are without this character). Area of teeth consists of many small teeth. Ejaculatory apodeme dark, short and broad; base of ejaculatory apodeme long, basally widely fused, horseshoe-shaped. Posterior portion of gonocoxal apodeme medium sized and brown. Anterior portion of gonocoxal apodeme long and dark brown.

**Body size:** 2.1–3.8 mm.

**Female.** Tonnoir & Edwards (1927) designated two female paratypes of *Ps. zealandica*. The metadata of one of those (BMNH(E)250343) are available online from the Natural History Museum (2014). However, those types are not included in the present study. Some descriptive information is given by Tonnoir & Edwards (1927) and by Menzel & Mohrig (2000).

**Genetic distances.** The maximum p-distance between all 17 available COI sequences is 2.43%. The nearest neighbour is *Psl. teo*, diverging by a minimum of 10.63%. All three available conspecific 28S sequences are identical and show no differences to the sequences of *Psl. zealandica* and *Psl. sp. II*.

**Remarks.** All previous studies containing descriptions of the morphology of *Psl. zealandica* (Tonnoir & Edwards 1927; Mohrig & Jaschhof 1999; Menzel & Mohrig 2000) did not mention the groups of additional lateral teeth on both sides of the median structure on the tegmen (Fig. 12). In fact, the holotype does not have this unique feature, and even among the material available to Mohrig & Jaschhof (1999), this feature is rarely present. The quality of the preparation also influences whether the teeth are easy to observe or not. Removal of tergite IX increases the possibility of observing teeth. In addition, specimens from New Zealand's South Island—examined in the present study for the first time—have a higher expression rate of this character and a larger number of teeth, when present. The presence of these lateral teeth is not homogenously distributed across both populations (chi-square test of homogeneity,  $\chi^2 \approx 13.38$ ,  $\alpha < 0.005$ ).

### *Pseudolycoriella aotearoa* sp. n.

(Figs 3 & 13)

urn:lsid:zoobank.org:act:02F615B4-A7CB-4F4C-8736-1D568B686260

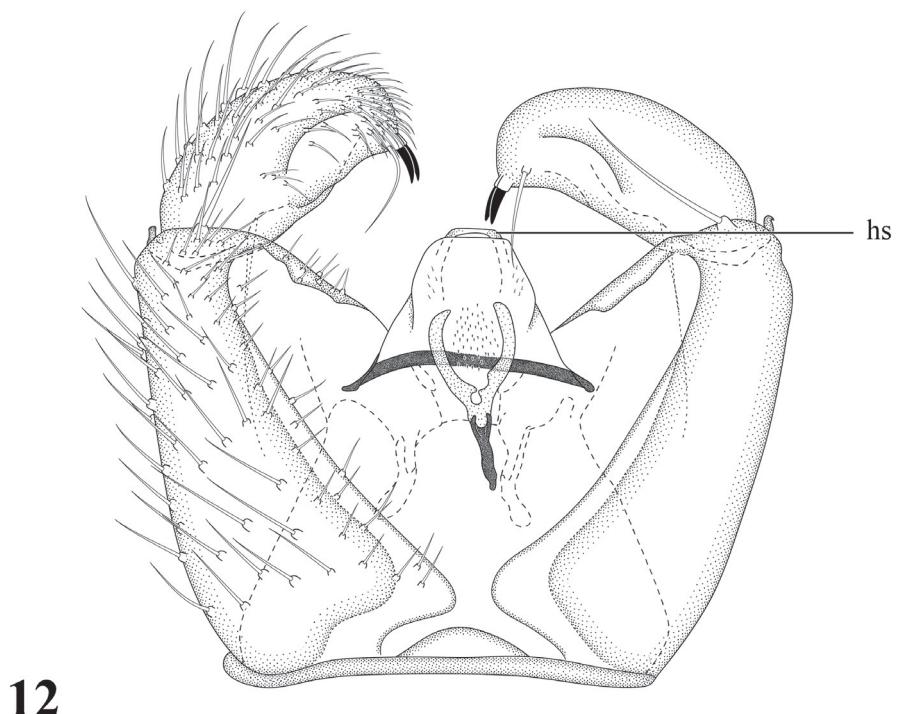
**Literature.** *Pseudolycoriella zealandica* (Edwards, 1927): Mohrig & Jaschhof (1999): 37 [misidentification].

**Material studied.** *Holotype male*. New Zealand: North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest, Malaise trap, 26.11–28.12.2002, leg. M. & C. Jaschhof & U. Kallweit (NZAC, SDEI-Dipt-0000997). *Paratypes*: 11♂♂ same date and same locality as holotype (4x NZAC, SDEI-Dipt-0001000; 7x SDEI, SDEI-Dipt-0000625, SDEI-Dipt-0000758, SDEI-Dipt-0000978 & SDEI-Dipt-0000999). 2♂♂ North Island, Taupo, Hauhungaroa Range, 5 km southwest of Tihoi, *Podocarpus* wood with ground ferns, sweep net, 21.12.1992, leg. M. Jaschhof (all PWMP [previously misidentified, published as *Psl. zealandica* in Mohrig & Jaschhof (1999)]).

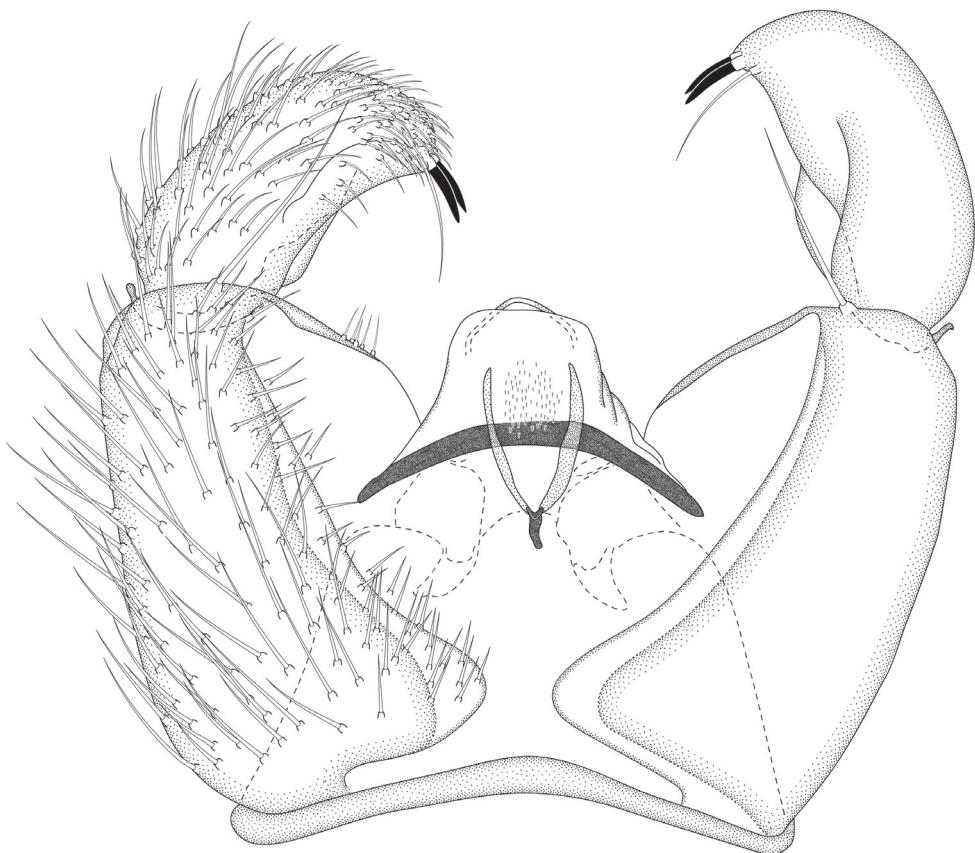
**Description. Male.** **Head.** Head capsule brown. Eye bridge four facets wide, two to three facets at margin. Scape and pedicel slightly paler than the flagellomeres; fourth flagellomere (Fig. 3) 2.3–2.6 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough, sensilla of two different lengths, small ones and longer, curved sensilla; setae on the flagellomere dense and as long as flagellomere width, slightly curved. Maxillary palp long and three-segmented, first palpomere longest, second one shortest; first palpomere with an inconspicuous patch of sensilla and four to eight long bristles, one of these bristles longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** brown, paler than head; some specimens with small anterior and posterior brightened parts. Posterior pronotum bare. Anterior pronotum with seven to eleven setae. Episternum 1 with four to eleven setae. Mesonotum with six to eleven robust lateral bristles; row of dorsocentral bristles well developed. Scutellum with six to nine robust bristles and several minor setae. Katepisternum slightly longer than high. **Wing.** Length 2.6–3.3 mm; width/length ratio 0.34–0.38. Membrane smoky and without macrotrichia, anal area present; all posterior veins distinct, stem of M weakest, apical half of  $R_5$  with macrotrichia on ventral and dorsal side; bM bare, r-m bare or with up to two setae;  $R_1$  0.8–1.0 times as long as R; c/w ratio 0.70–0.81; r-m 0.7–0.8 as long as bM. Haltere short and sooty brown; knob as long as shaft, or slightly longer than shaft. **Legs** pale brown. Tibial organ surrounded by a circular border and wider than half width of tibial apex; tibial organ consists of a transverse row of bristles. Fore and mid tibia without robust bristles among vestiture. Hind tibia with two to seven robust bristles organised in a longitudinal, posteriodorsal row. All tibial spurs equal in length. Claws with robust teeth, arranged in decreasing size. **Abdomen** brown, slightly paler than thorax, with dark setae. **Hypopygium** (Fig. 13). Gonocoxites wider than long, inner side of gonocoxites with a membranous area scattered with short pale setae, outer side with long setae; ventral, inner side of gonocoxites basally not fused. Gonostylus bean shaped, 2.1–2.4 times longer than wide, apically with a large inner cavity without any microtrichia, two robust spines and one long whip-lash hair present. Tegmen trapezoid with a strongly sclerotized base, parameral apodeme short and robust; medially with a broad hood-like structure. Area of teeth consists of many small teeth. Ejaculatory apodeme dark, short and narrow; base of ejaculatory apodeme long and narrow. Posterior portion of gonocoxal apodeme medium sized and brown. Anterior portion of gonocoxal apodeme short, comma-shaped, and dark brown.

*Body size*: 3.2–4.4 mm.

*Female*. Unknown.



12



13

12–13  
100 µm

**FIGURES 12–13.** *Pseudolycoriella zealandica* complex, hypopygia. **12.** *Pseudolycoriella zealandica* (Edwards). **13.** *Pseudolycoriella aotearoa* sp. n. Abbreviation: hs = hood-like structure.

**Genetic distances.** The maximum p-distance between all six available COI sequences is 0.76%. The nearest neighbour is *Psl. zealandica*, diverging by a minimum of 12.21%. One successfully obtained 28S sequence is identical to those of *Psl. zealandica* and *Psl. sp. II*.

**Etymology.** *Aotearoa* is the Māori word for New Zealand and was chosen as an epithet for the newly described species to underline the close phylogenetic relationship to *Psl. zealandica*.

**Distribution.** New Zealand.

**Discussion.** *Pseudolycoriella aotearoa* is the sister species of *Psl. zealandica*, and therefore morphologically very similar. However, in general *Psl. aotearoa* has a larger body size and a greater wing length. The discrimination of both species, relying on these characters only, is not sufficient, because both ranges show overlaps. The lengths of the gonostyli of both species do not show identical values, but are very close together (170–200 µm vs. 210–230 µm). A more reliable character is the structure of the base of the ejaculatory apodeme. *Pseudolycoriella aotearoa* has a base consisting of two long and slender branches while *Psl. zealandica* has broader and widely connected branches. Further, the tegmen shows differences. The basal width of the tegmen is wider in *Psl. aotearoa* and the middle hood-like structure is also broader. Lateral teeth on the tegmen as found in some specimens of *Psl. zealandica* are absent in *Psl. aotearoa*.

Due to its large body size *Psl. aotearoa* also resembles *Psl. skusei* Mohrig, Kauschke & Broadley and *Psl. tenebrioalata* Mohrig. Nevertheless, the structure of the hypopygia differs significantly. *Pseudolycoriella skusei* has an elongated gonostylus with a sharp apical bend and more spines and more whip-lash hairs than *Psl. aotearoa* (Mohrig *et al.* 2016). *Pseudolycoriella tenebrioalata* shows a similar gonostylar shape and a similar arrangement of spines. However, the tegmen structure and the ejaculatory apodeme differ fundamentally (Mohrig 2013). *Pseudolycoriella tenebrioalata* has a tegmen that is just slightly tapered towards the apex, and the ejaculatory apodeme is very short. Furthermore *Psl. tenebrioalata* does not have a border on its tibial organ, and its claws lack any teeth (Mohrig 2013).

## *Pseudolycoriella* sp. II

**Material studied.** 1♀, New Zealand: South Island, Canterbury, Selwyn, Cass, Middle Bush, 17.11.1998, Malaise trap, leg. P.M. Johns (SDEI, SDEI-Dipt-0000745).

**Genetic distances.** The nearest neighbour of the COI-sequence of *Psl. sp. II* is *Psl. orite*, diverging by a minimum of 10.89%. The one successfully sequenced 28S sequence is identical to those of *Psl. zealandica* and *Psl. aotearoa*.

**Discussion.** The molecular analysis of the female specimen SDEI-Dipt-0000745 revealed an isolated cluster for all three genetic markers, and consequently a well separated cluster in the consensus tree shown in Figure 61. Therefore, the presence of a new and undescribed species is very likely, but without conspecific male specimens a reasonable description allowing meaningful comparisons with other *Pseudolycoriella* species is not possible.

## *Pseudolycoriella bispina* complex

The following six species form the *Psl. bispina* complex. Common to them is a small body size, and presence of lateral lobes on the tegmen. The phylogeny of this complex is depicted in Figure 61.

**Discussion.** This complex can be assigned to the *Psl. bruckii* group. Nevertheless, due to its small body size and the two spines on the gonostylus the species of the *Psl. bispina* complex resemble the *Psl. longicostalis* group from Papua New Guinea (Mohrig 2013). Furthermore, some of those species share the very robust bristles arranged in a posteriodorsal row on the hind tibia. However, the two apicolateral lobes on the tegmen of *Psl. bispina* and the other species of this complex cannot be found in the *Psl. longicostalis* group. As an additional character Mohrig (2013) emphasised that these species have very robust bristles in the posteriodorsal row on the hind tibia, which could also be found in the *Psl. bispina* complex, except in *Psl. mahanga*. Nevertheless, all these species are not assigned to the *Psl. longicostalis* group. The key characteristics like the conspicuous row of robust bristles on the hind tibia surely result from convergent miniaturisations of two independent stem species with a typical *Psl. bruckii* group habitus.

Conspicuous apicolateral lobes can be found in other *Pseudolycoriella* species: for instance, *Psl. commoda*

Mohrig (*Pseudolycoriella triacanthula* group; Mohrig 2013), and *Psl. microphalli* Mohrig and *Psl. bitorquia* Mohrig (*Psl. quadrispinosa* group; Mohrig 2013). A confusion of those three species with *Psl. bispina* and its close relatives is not expected, because all of the Papua New Guinea species have three gonostylar spines and remarkable dorsal teeth on the claws. Among the New Zealand species, *Psl. cavatica*, *Psl. kaikoura*, and the species of the *Psl. jejuna* complex have similar lateral lobes on the tegmen, but these species differ either by the reduction of the number of gonostylar spines or the shape of the gonostylus together with stout flagellomeres. Although the monophyly of the *Psl. bispina* complex is highly supported by genetic data, no unequivocal apomorphic characters could be identified.

### ***Pseudolycoriella bispina* Mohrig, 1999**

(Figs 4 & 14)

**Literature.** *Pseudolycoriella bispina* Mohrig, 1999: Mohrig & Jaschhof (1999): 40–41, Fig. 20 a–g.—Macfarlane *et al.* (2010): 441.

**Material studied.** *Holotype male.* New Zealand: North Island, Wairoa, Urewera National Park, Huiarau Range 30 km southeast of Murupara, altitude 600–1,000 m, *Podocarpus-Nothofagus* wood, sweep net, 23.12.1992, leg. M. Jaschhof (PWMP). *Paratype.* 1♂ same locality and same date as holotype (PWMP). *New records:* 1♂ North Island, Thames-Coromandel, Coromandel, Kirikiri Saddle, Kaitarakiri Track, secondary mixed podocarp/broadleaf forest, sweep net, 09.02.2002, leg. M. Jaschhof (SDEI). 1♂ North Island, Western Bay of Plenty, Katikati, 140 Wharawhara Road, bush area, pitfall trap, 14.02–05.03.2015, leg. P.A. Maddison (SDEI, SDEI-Dipt-0001418). 1♂ North Island, Western Bay of Plenty, Katikati, 449 Lund Road, Malaise trap, 25.07–08.08.2016, leg. P.A. Maddison (SDEI, SDEI-Dipt-0001251). 3♂♂ North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest, sweep net, 03–04.02.2002, leg. M. Jaschhof (2x NZAC, SDEI-Dipt-0000946 & SDEI-Dipt-0001526; 1x SDEI, SDEI-Dipt-0001522). 6♂♂ North Island, Taupo, Pureora Forest Park, Waipapa Reserve, altitude 600 m, mixed podocarp/broadleaf forest, sweep net, 04–05.02.2002, leg. M. Jaschhof (3x NZAC, SDEI-Dipt-0000974, SDEI-Dipt-0000975 & SDEI-Dipt-0001516; 3x SDEI, SDEI-Dipt-0000844, SDEI-Dipt-0001517 & SDEI-Dipt-0001518). 1♂ same locality as previous, sweep net, 24–25.11.2002 leg. M. Jaschhof (SDEI).

**Redescription. Male.** **Head.** Head capsule brown. Eye bridge three facets wide, two facets at margin. Scape and pedicel slightly paler than the flagellomeres; fourth flagellomere 3.1–3.4 times longer than wide (Fig. 4); necks of flagellomeres well differentiated; surface of flagellomeres rough, sparsely scattered with long setae arising from slight elevations, setae 1.5 times as long as flagellomere width; sensilla of two different lengths present, small ones and longer, curved sensilla. Maxillary palp long and three-segmented, first palpomere usually as long as third, second one shortest; first palpomere with an inconspicuous patch of sensilla and two to five bristles, one of these bristles longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** brown, paler than head. Posterior pronotum bare. Anterior pronotum with three to five setae. Episternum 1 with three to eight setae. Mesonotum with four to five robust lateral bristles; row of dorsocentral bristles well developed. Scutellum with four robust bristles and several minor setae. Katepisternum slightly longer than high. **Wing.** Length 1.7–2.1 mm; width/length ratio 0.35–0.39. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, stem of M weakest,  $R_5$  without macrotrichia on ventral side; bM and r-m bare;  $R_1$  0.6–0.8 times as long as R; c/w ratio 0.61–0.72; r-m 0.7–0.9 as long as bM. Haltere short; knob as long as shaft. **Legs** pale, trochanter slightly darkened. Tibial organ surrounded by a circular border and wider than half width of tibial apex; tibial organ consists of an irregular transverse row of bristles and some bristles above the row. Fore tibia without robust bristles among the vestiture. Mid tibia mostly without robust bristles, exceptionally four specimens with one bristle among vestiture. Hind tibia with ten to 16 very robust bristles arranged in a longitudinal, posteriodorsal row; on posterior side of hind tibia one to six robust bristles among the vestiture. All tibial spurs equal in length. Claws with robust teeth, arranged in decreasing size. **Abdomen** brown with dark setae. **Hypopygium** (Fig. 14). Gonocoxites wider than long, inner side of gonocoxites basally widely separated. Gonostylus short, and curved, 1.9–2.4 times longer than wide, apically with a large inner cavity, dorsal inner margin also apically constricted; two robust spines present, the dorsal one located on a basal lobe and unusually straight; one long whip-lash hair is located on the ventral apex of the gonostylus. Tegmen broader than long, apicolaterally with two strongly sclerotized lobes, apex roundish

and surrounded by a thin sclerotized margin, only exceptionally with a small membranous area; parameral apodeme short and robust. Area of teeth consists of nine to 20 small teeth. Ejaculatory apodeme dark, of medium length and narrow; base of ejaculatory apodeme pale, lyre-shaped e.g. broadly fused basally with two medium long branches. Posterior portion of gonocoxal apodeme of medium size and brown, medially connected by a slender bridge. Anterior portion of gonocoxal apodeme long and broad.

*Body size:* 1.9–2.5 mm.

*Female.* Unknown.

**Genetic distances.** The maximum p-distance between all nine available COI sequences is 3.07%. The nearest neighbour is *Psl. mahanga*, diverging by a minimum of 7.14%. The maximum p-distance between all five available 28S sequences is 0.12%. The nearest neighbour is *Psl. mahanga*, diverging by a minimum of 0.06%.

**Distribution.** New Zealand.

**Remarks.** One paratype of *Psl. bispina*, deposited in the NZAC, was not investigated in the present study and its species affiliation has not been revised. Nevertheless, it has to be mentioned, that it is labelled with another locality than published in Mohrig & Jaschhof (1999). According to New Zealand Arthropod Collection (2019) the collection data are: one paratype, North Island, Taupo, Hauhungaroa Range, 5 km SW Tihoi, podocarp forest, sweep net, 21.12.1992, leg. Jaschhof (NZAC, NZAC02016076).

### *Pseudolycoriella teo* sp. n.

(Fig. 15)

urn:lsid:zoobank.org:act:NomenclaturalActs/5CAAD136-9980-4B4D-8536-B0A7034BFD41

**Material studied.** *Holotype male.* New Zealand: Taupo, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, 690 m, mixed podocarp/broadleaf forest; sweep net, 03–04.02.2002, leg. M. Jaschhof (NZAC, SDEI-Dipt-0001528).

**Description. Male.** Head capsule brown. Eye bridge three facets wide, two facets at margin. Scape, pedicel and flagellomeres concolourous; fourth flagellomere 3.3 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres slightly rough without deep pits, sparsely scattered with long setae, which are 1.5 times as long as flagellomere width; small sensilla and longer, curved sensilla present. Maxillary palp three-segmented; palpomeres inappropriately prepared in the holotype; first palpomere with four bristles, one of these bristles longer and more robust. Prefrons and clypeus slightly bulging. **Thorax** brown, paler than head, central parts brighter. Posterior pronotum bare. Anterior pronotum with two setae. Episternum 1 with five setae. Mesonotum with four robust lateral bristles; row of dorsocentral bristles present. Scutellum with four sockets, which formerly contained robust bristles. Katepisternum longer than high. **Wing.** Length 1.9 mm; width/length ratio 0.36. Membrane transparent and without macrotrichia, anal area well developed; all posterior veins distinct, stem of M weakest,  $R_5$  only with macrotrichia on the dorsal side; bM bare and r-m bare;  $R_1$  0.6 times as long as R; c/w ratio 0.59; r-m 0.9 as long as bM. Haltere short; knob as long as shaft. **Legs** pale. Tibial organ surrounded by a circular border and as long as half width of tibial apex; tibial organ consists of an irregular transverse row of bristles. Fore and mid tibia without robust bristles among vestiture. Hind tibia with seven very robust bristles arranged in a longitudinal, posteriodorsal row; on posterior side of hind tibia two robust bristles among vestiture. All tibial spurs equal in length. Claws strongly toothed. **Abdomen** concolourous with thorax. **Hypopygium** (Fig. 15). Gonocoxites wider than long, inner side of gonocoxites basally not fused. Gonostylus short, bean-shaped and only with a very slight curvation, 2.3 times longer than wide, apex rounded and with a small inner cavity; two robust spines present, not inserting on basal lobes; one whip-lash hair present on the ventral apex of the gonostylus. Tegmen broader than long, apicolaterally with two not very broad, strongly sclerotized lobes, apex membranous; parameral apodeme short and robust. Area of teeth consisting of approximately 15 small teeth. Ejaculatory apodeme brown, medium long and broad; base of ejaculatory apodeme delicate. Posterior portion of gonocoxal apodeme medium sized and brown. Anterior portion of gonocoxal apodeme long and broad.

*Body size:* 1.7 mm.

*Female.* Unknown.

**Genetic distances.** Because there is only a single specimen, no intraspecific distance is calculable. The nearest neighbour is *Psl. jaschhofi*, diverging by a minimum of 4.92%. For the 28S sequence the nearest neighbour is *Psl. mahanga*, diverging by a minimum of 0.13%.

**Etymology.** The Māori adjective *teo* means small and was therefore deemed to be a suitable name for one of the smallest New Zealand *Pseudolycoriella* species.

**Distribution.** New Zealand.

**Discussion.** *Pseudolycoriella teo* has the smallest body size of the six species of *Psl. bispina* complex. Nevertheless, some specimens of *Psl. orite* have similarly small body sizes. In fact, this species is very similar to *Psl. teo*. The best distinguishing characters for *Psl. teo* are the shorter length of the gonocoxites and the very round apex of the gonostylus, which also has a small inconspicuous apical cavity.

***Pseudolycoriella puhihi* sp. n.**

(Figs 5 & 16)

urn:lsid:zoobank.org:act:NomenclaturalActs/0C3972BD-BD5F-4A83-A049-03D6FC42CCB7

**Material studied.** *Holotype male.* New Zealand: North Island, Taupo, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, 690 m, mixed podocarp/broadleaf forest, by sweep net, 03–04.02.2002, leg. M. Jaschhof (NZAC, SDEI-Dipt-0001523). *Paratypes.* 2♂♂ North Island, Bay of Plenty, Katikati, 140 Wharawhara Road, bush area, pit-fall traps, 14.02–05.03.2015, leg. P.A. Maddison (NZAC; SDEI, SDEI-Dipt-0001420); 2♂♂ North Island, Bay of Plenty, Katikati, 140 Wharawhara Road, bush area, Malaise trap, 14.02–05.03.2015, leg. P.A. Maddison (NZAC, SDEI-Dipt-0001005 [without hypopygium]; SDEI, SDEI-Dipt-0001422). 1♂ North Island, Taupo, Hauhungaroa Range, 5 km southwest of Tihoi, *Podocarpus* wood with ground ferns, sweep net, 21.12.1992, leg. M. Jaschhof (PWMP [previously misidentified, published as *Psl. bispina* in Mohrig & Jaschhof (1999); incorrect collection locality published in Mohrig & Jaschhof (1999), slide with the printed label: “Neuseeland, Nordinsel / Hauhungaroa Range, / Tihoi / Podocarpus-Wald / 21.12.1992 Käscher / leg. Jaschhof / coll. Mohrig”]).

**Description. Male.** Head capsule brown. Eye bridge three facets wide, two facets at margin. Scape and pedicel usually concolourous with flagellomeres, rarely with a slightly paler pedicel; fourth flagellomere 2.3–2.5 times longer than wide (Fig. 5); necks of flagellomeres well differentiated; surface of flagellomeres rough with deep pits, densely scattered with long setae, which are as long as flagellomere width; small sensilla and longer, curved sensilla present. Maxillary palp three-segmented, first palpomere mostly as long as third, second one shortest, first palpomere with three to five bristles, one of these bristles longer and more robust. Prefrons and clypeus slightly bulging. **Thorax** brown, paler than head, central parts brighter. Posterior pronotum bare. Anterior pronotum with three to seven setae. Episternum 1 with five to seven setae. Mesonotum with four to five robust lateral bristles; row of dorsocentral bristles present. Scutellum with four robust bristles and several minor setae. Katepisternum slightly longer than high. **Wing.** Length 1.5–1.8 mm; width/length ratio 0.36–0.39. Membrane transparent and without macrotrichia, anal area well developed; all posterior veins distinct, stem of M weakest, apex of  $R_s$  with up to five additional setae on the ventral side; bM and r-m bare;  $R_s$  0.6–0.7 times as long as R; c/w ratio 0.65–0.71; r-m 0.9–1.2 as long as bM. Haltere short; knob as long as shaft. **Legs** pale. Tibial organ surrounded by a circular border and as long as half width of tibial apex; tibial organ consists of an irregular transverse row of bristles. Fore tibia without robust bristles among vestiture. Mid tibia with one to two bristles among vestiture. Hind tibia with eight to ten robust bristles organised in a longitudinal, posteriodorsal row; on posterior side of hind tibia one to four robust bristles among vestiture. All tibial spurs equal in length. Claws strongly toothed. **Abdomen** concolourous with thorax. **Hypopygium** (Fig. 16). Gonocoxites wider than long, inner side of gonocoxites not fused basally. Gonostylus short, bean-shaped, and slightly curved, 1.9–2.2 times longer than wide, inner median edge strongly concave, apex blunt and with an inner cavity; two robust spines present, not inserted on basal lobes; one whip-lash hair present on the ventral apex of the gonostylus; on inner median site with conspicuous tendon insertion (*ti* in Fig. 16). Tegmen broader than long, apicolaterally with two not very broad, strongly sclerotized lobes, apex with a membranous edge; parameral apodeme short and robust. Area of teeth consists of approximately 15 small teeth. Ejaculatory apodeme brown, of medium length and narrow; base of ejaculatory apodeme delicate with thin branches. Posterior portion of gonocoxal apodeme of medium size and brown. Anterior portion of gonocoxal apodeme long and narrow.

*Body size:* 1.8–2.2 mm.

*Female.* Unknown.

**Genetic distances.** The maximum p-distance between all four available COI sequences is 4.44%. The nearest neighbour is *Psl. orite*, diverging by a minimum of 7.54%. Both available 28S sequences are identical and show no differences to a sequence of *Psl. orite*.

**Etymology.** *Pūhihi* is the Māori word for antenna. The epithet refers to the distinctive flagellomeres compared to the other species closely related to *Psl. bispina*.

**Distribution.** New Zealand.

**Discussion.** Among the species of the *Psl. bispina* complex, *Psl. puhihi* is the only one where the length to width ratio of the fourth flagellomere is less than three. This ratio results from the greater width of the flagellomeres (Fig. 5). In addition, the flagellomeres are much more densely setose than in the other five species of this species complex. Furthermore, the length of the wing is shorter than in most other species around *Psl. bispina* ( $\leq 1.8$  mm). The only exception that was examined is one specimen of *Psl. bispina* (SDEI-Dipt-0001418), which also had a short wing length ( $< 1.8$  mm).

***Pseudolycoriella orite* sp. n.**

(Fig. 17)

urn:lsid:zoobank.org:act:FB195DA5-5D08-4CE0-990C-111633F9F7E1

**Material studied.** *Holotype male.* New Zealand: North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest, sweep net, 03–04.02.2002, leg. M. Jaschhof (NZAC, SDEI-Dipt-0000863). *Paratypes:* 8♂♂ same locality and same date as holotype (3x NZAC, SDEI-Dipt-0001519, SDEI-Dipt-0001527 & SDEI-Dipt-0001529; 5x SDEI, SDEI-Dipt-0001520, SDEI-Dipt-0001521, SDEI-Dipt-0001524, SDEI-Dipt-0001525 & SDEI-Dipt-0001533). 1♂ North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 7 km NE Ohakune, mixed *Nothofagus*/podocarp forest, sweep net, 03.02.2002, leg. M. Jaschhof (SDEI). 3♂♂ North Island, Masterton, Tararua Forest Park, Blue Range Hut Track 10 km SW Mt. Bruce, mixed *Nothofagus*/podocarp/broadleaf forest, sweep net, 02.02.2002, leg. M. Jaschhof (2x NZAC; 1x SDEI).

**Description. Male.** **Head.** Head capsule brown. Eye bridge three facets wide, two facets at margin. Scape and pedicel concolourous with flagellomeres; fourth flagellomere 3.0–3.6 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough with deep pits, sparsely scattered with long setae, which are 1.5 times as long as flagellomere width; small sensilla and longer, curved sensilla present. Maxillary palp three-segmented, first palpomere mostly as long as third, second one shortest, first palpomere with two to four bristles, one of these bristles longer and more robust. Prefrons and clypeus slightly bulging. **Thorax** brown, paler than head, central parts brighter. Posterior pronotum bare. Anterior pronotum with two to four setae. Episternum 1 with three to six setae. Mesonotum with four robust lateral bristles; row of dorsocentral bristles present. Scutellum with four robust bristles and several minor setae. Katepisternum longer than high. **Wing.** Length 1.8–2.2 mm; width/length ratio 0.34–0.36. Membrane transparent and without macrotrichia, anal area weakly developed; all posterior veins distinct, stem of M weakest,  $R_5$  only with setae on the dorsal side; bM and r-m bare;  $R_1$  0.5–0.7 times as long as R; c/w ratio 0.66–0.70; r-m 0.5–1.0 as long as bM. Haltere short; shaft slightly longer than knob. **Legs** pale. Tibial organ surrounded by a circular border and as long as half of the width of the tibial apex; tibial organ consists of an irregular transverse row of bristles. Fore tibia without robust bristles among vestiture. Mid tibia mostly with one bristle among vestiture. Hind tibia with eight to nine very robust bristles arranged in a longitudinal, posteriodorsal row; on posterior side of hind tibia one to three robust bristles among vestiture. All tibial spurs equal in length. Claws strongly toothed. **Abdomen** concolourous with thorax. **Hypopygium** (Fig. 17). Gonocoxites wider than long, inner side of gonocoxites not fused basally. Gonostylus short, bean-shaped, and slightly curved, 2.0–2.3 times longer than wide, on inner median side with a clearly developed tendon insertion, apex blunt and with a large apical cavity; two robust spines present, dorsal spine on a small basal lobe; one whip-lash hair present on the ventral apex of the gonostylus. Tegmen broader than long, apicolaterally with two long, strongly sclerotized lobes, apex with a small membranous edge; parameral apodeme robust, short to medium long. Area of teeth with six to twelve small teeth. Ejaculatory apodeme brown, medium long and broad; base of ejaculatory apodeme delicate with two thin branches. Posterior portion of gonocoxal apodeme medium sized and brown. Anterior portion of gonocoxal apodeme long and broad.

*Body size:* 1.8–2.1 mm.

*Female.* Unknown.

**Genetic distances.** The maximum p-distance between all six available COI sequences is 0.39%. The nearest neighbour is *Psl. jaschhofi*, diverging by a minimum of 6.35%. The p-distance between both available 28S sequences is 0.12%. One of those sequences is identical to one sequence of *Psl. puhihi*.

**Etymology.** In Māori the word *ōrite* means being equal or being similar. The epithet indicates the morphologi-

cal similarity of the newly described species to its sibling species.

**Distribution.** New Zealand.

**Discussion.** It is not easy to distinguish this new species from its relatives within the *Psl. bispina* complex. However, *Psl. bispina* and *Psl. mahanga* show diagnostic differences in the apical edge of the tegmen (fully sclerotized vs. membranous) and the base of the ejaculatory apodeme (lyre-shaped vs. narrow and bifurcated along the whole length). *Pseudolycoriella puhuhi* can be distinguished by the shorter and wider fourth flagellomere and the more clearly developed tendon insertion of the gonostylus adductor. *Pseudolycoriella teo* has shorter gonocoxites and gonostyli, and a lower c/w ratio (0.59 vs.  $\geq 0.66$ ). The new species and *Psl. porehu* are the most similar species of this complex. Of all members, both species have the narrowest wings, and therefore the lowest ratio of width to length of wings and the least developed anal area. In order to distinguish between these species, the body size must be taken into account. On average, *Psl. porehu* has a larger body size, but there is some overlap with *Psl. orite*. However, the wing length is always less than 2.2 mm in *Psl. orite*, and greater than or equal to 2.2 mm in *Psl. porehu*. The c/w ratio also differs: it is less than 0.65 in *Psl. porehu* and greater than 0.65 in *Psl. orite*. Further minor distinguishing characters are found in the robust bristles among the vestiture of the tibiae: on the mid tibia *Psl. orite* bears one (or no) robust bristle while *Psl. porehu* has three to five bristles; on the hind tibia the longitudinal, posteriodorsal row contains three to six bristles in *Psl. porehu* and eight to nine bristles in *Psl. orite*. Unfortunately, for *Psl. porehu* no genetic data are available, which could be used to verify this morphological species delimitation.

### *Pseudolycoriella mahanga* sp. n.

(Fig. 18)

urn:lsid:zoobank.org:act:14AD5BCD-06F0-4CBC-BB21-8E519C072047

**Material studied.** *Holotype male.* New Zealand: South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, opposite Gladehouse Track, *Nothofagus* forest, Malaise trap, 01–21.12.2002, leg. M. & C. Jaschhof & U. Kallweit (NZAC, SDEI-Dipt-0001008). *Paratypes:* 15♂♂ South Island, Westland, 5 km SW Arawhata, mixed *Nothofagus*/podocarp forest, aspirator, 20.10.2001, leg. M. Jaschhof (7x NZAC; 8x SDEI). 1♂ South Island, Queenstown Lakes, Otago Lakes, Mt Aspiring NP, Makarora River Valley near Cameron Creek Track, mixed *Nothofagus*/broadleaf forest, sweep net, 18–19.12.2002, leg. M. Jaschhof (SDEI, SDEI-Dipt-0000595). 2♂♂ South Island, Southland, Fiordland, Fiordland NP, 3 km E Milford Sound, mixed podocarp/broadleaf forest, Malaise trap, 01–21.12.2002, leg. M. & C. Jaschhof & U. Kallweit (NZAC; SDEI). 1♂ same locality as previous, sweep net, 21.12.2002, leg. M. Jaschhof (NZAC). 1♂ South Island, Southland, Fiordland, Fiordland NP, 4 km E Milford Sound, mixed broadleaf/*Nothofagus* forest, sweep net, 07.01.2002, leg. M. Jaschhof (NZAC; SDEI-Dipt-0000904). 1♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, opposite Earl Mountain Tracks, *Nothofagus* forest, Malaise trap, 05–24.01.2002, leg. M. & C. Jaschhof (SDEI, SDEI-Dipt-0000849). *Additional material:* 5♂♂ South Island, Kaikoura, Blue Duck Reserve, altitude 300–400 m, mixed podocarp/*Nothofagus solandri* forest, sweep net, 29.11.2001, leg. M. Jaschhof; U. Kallweit & A. Stark (SDEI).

**Description. Male.** **Head.** Head capsule brown. Eye bridge three facets wide, two facets at margin. Scape and pedicel concolourous with flagellomeres; fourth flagellomere 3.0–3.5 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough, sparsely scattered with long setae arising from slight elevations, setae 1.5 times as long as flagellomere width; sensilla of two different lengths present, small ones and longer, curved sensilla. Maxillary palp long and three-segmented, first palpomere slightly longer than third, second one shortest; first palpomere with an inconspicuous patch of sensilla and two to five bristles, one of these bristles longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** brown, central parts brightened. Posterior pronotum bare. Anterior pronotum with three to seven setae. Episternum 1 with five to ten setae. Mesonotum with four to six robust lateral bristles; row of dorsocentral bristles well developed. Scutellum with four robust bristles (exceptionally five) and several minor setae. Katepisternum as long as high, or slightly longer than high. **Wing.** Length 2.0–2.4 mm; width/length ratio 0.35–0.42. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, stem of M weakest, apical quarter to apical third of  $R_s$  with macrotrichia on both sides; bM and r-m bare;  $R_1$  0.6–1.0 times as long as R; c/w ratio 0.66–0.76 (specimens from Kaikoura show a c/w ratio from 0.53–0.60); r-m 0.7–1.1 as long as bM (specimens from Kaikoura 0.9–1.5). Haltere short; knob as long as shaft. **Legs** pale brown, trochanter slightly darkened. Tibial organ surrounded by a circular border and wider than half width of tibial apex; tibial organ consists of an irregular transverse row of bristles and some bristles above

the row. Fore tibia without robust bristles among vestiture. Mid tibia without or exceptionally with one robust bristle among vestiture. Hind tibia with three to nine robust bristles organised in a longitudinal, posteriodorsal row; on posterior side of hind tibia one to three robust bristles among vestiture. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** brown with dark setae. **Hypopygium** (Fig. 18). Gonocoxites wider than long, basal inner side of gonocoxites widely separated. Gonostylus short, curved, and hunchbacked, 1.7–2.3 times longer than wide, apically with a large inner cavity; two robust spines present, the dorsal one located on a basal lobe; one long whip-lash hair is located on the ventral apex of the gonostylus. Tegmen wider than long, apicolaterally with two strongly sclerotized lobes, apex roundish and surrounded by a strongly sclerotized margin, only exceptionally with a small membranous area; parameral apodeme short and robust. Area of teeth consists of 15 to 30 small teeth. Ejaculatory apodeme dark, broad, and short to medium long; base of ejaculatory apodeme pale, lyre-shaped, branches of base of ejaculatory apodeme of different width. Posterior portion of gonocoxal apodeme medium sized and brown. Anterior portion of gonocoxal apodeme long and broad.

**Body size:** 1.9–2.7 mm.

**Female.** Unknown.

**Genetic distances.** The maximum p-distance between the two available COI sequences is 1.14%. The nearest neighbour is *Psl. bispina*, diverging by a minimum of 7.14%. Both available 28S sequences are identical. The nearest neighbour is *Psl. bispina*, diverging by a minimum of 0.06%.

**Etymology.** The Māori word *māhanga*—meaning twin or twins—was selected as the epithet, to illustrate that the new described species is one of the sibling species around *Psl. bispina*.

**Distribution.** New Zealand.

**Discussion.** Of all species of this complex, only *Psl. mahanga* and *Psl. bispina* have in common a lyre-shaped base of the ejaculatory apodeme and a strongly sclerotized apex of the tegmen. *Pseudolycoriella mahanga* can be distinguished from *Psl. bispina* by the setosity of vein  $R_5$ . In *Psl. mahanga* macrotrichia are located on both the ventral and dorsal sides, whereas in *Psl. bispina* they occur only on the dorsal side. On the hind tibia *Psl. mahanga* has a less developed longitudinal row of robust bristles. Their number does not exceed nine and they are also smaller than in *Psl. bispina*.

Five males originating from the Blue Duck Reserve in the Kaikoura District differ significantly in c/w ratio from remaining specimens (0.53–0.60 vs. 0.66–0.76). Also, the r-m/bM ratio is slightly higher in some specimens from Kaikoura (0.7–1.1 vs. 0.9–1.5). Genetic data on this population are not available and no further morphological differences have been found, so it was decided not to describe a further new species. Because of this uncertainty, these specimens were not assigned to the type series of *Psl. mahanga*.

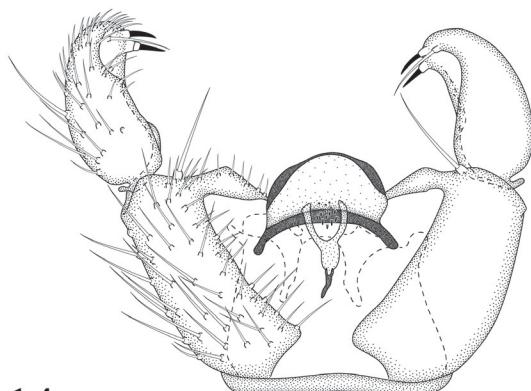
### *Pseudolycoriella porehu* sp. n.

(Fig. 19)

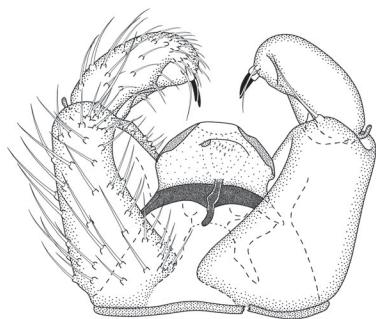
urn:lsid:zoobank.org:act:NomenclaturalActs/0B09BE48-A529-4737-B03E-CF2ED15CFAF9

**Material studied.** *Holotype male.* New Zealand: South Island, Clutha, Catlins, Purakaunui Scenic Reserve, mixed podocarp/broadleaf/*Nothofagus* forest, sweep net, 03.01.2002, leg. M. Jaschhof (NZAC, SDEI-Dipt-0001394). *Paratypes:* 4♂ same locality and same date as holotype (1x NZAC; 3x SDEI, SDEI-Dipt-0001485).

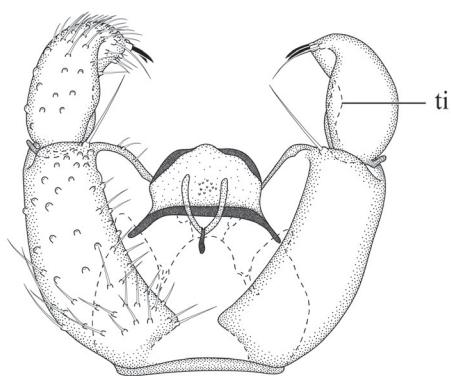
**Description. Male. Head.** Head capsule brown. Eye bridge three facets wide, two facets at margin. Scape and pedicel concolourous or slightly paler than flagellomeres; fourth flagellomere 3.3–3.9 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough, sparsely scattered with long setae arising from slight elevations, setae 1.5 times as long as flagellomere width; sensilla of two different lengths present, small ones and longer, curved sensilla. Maxillary palp long and three-segmented, first palpomere as long as third, second one shortest; first palpomere with an inconspicuous patch of sensilla and two to three bristles, one of these longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** pale brown to brown, central parts brighter. Posterior pronotum bare. Anterior pronotum with three to five setae. Episternum 1 with four to seven setae. Mesonotum with five to six robust lateral bristles; row of dorsocentral bristles well developed. Scutellum with four robust bristles and several minor setae. Katepisternum as long as high, or slightly longer than high. **Wing.** Length 2.2–2.3 mm; width/length ratio 0.33–0.36. Membrane transparent and without macrotrichia, anal area weakly developed; all posterior veins distinct, stem of M weakest, apical fifth to apical third of  $R_5$  with macrotrichia on ventral and dorsal side; bM and r-m bare;  $R_1$  0.6–0.7 times as long as R; c/w ratio 0.52–0.61; r-m 0.7–0.9 as long as bM. Haltere short; knob as long as shaft. **Legs** pale brown, trochanter slightly darkened. Tibial organ surrounded by a



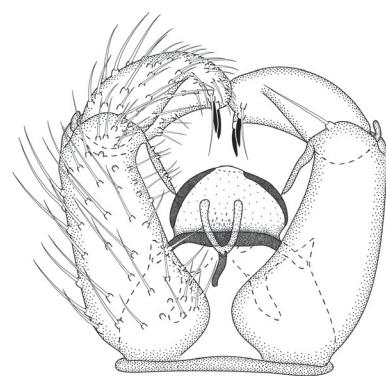
14



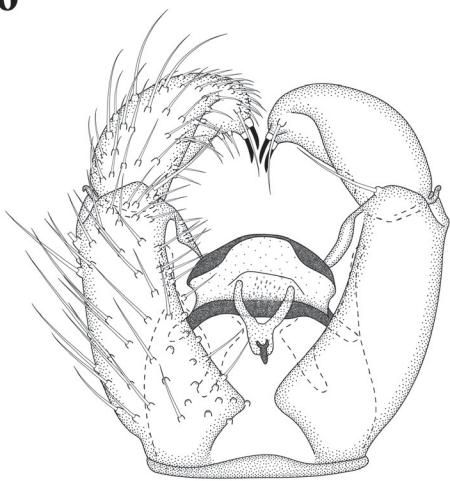
15



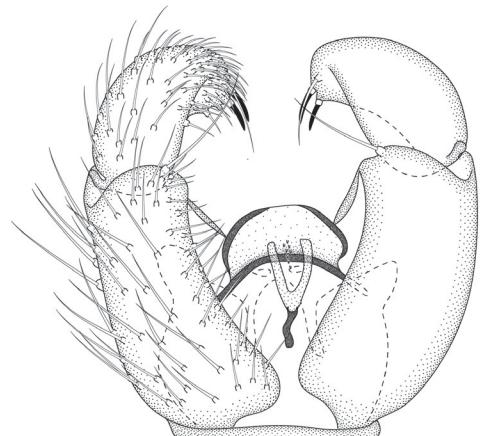
16



17



18



19

14–19  
100 µm

**FIGURES 14–19.** *Pseudolycoriella bispina* complex, hypopygia. **14.** *Pseudolycoriella bispina* Mohrig. **15.** *Pseudolycoriella teo* sp. n. **16.** *Pseudolycoriella puhih* sp. n. **17.** *Pseudolycoriella orite* sp. n. **18.** *Pseudolycoriella mahanga* sp. n. **19.** *Pseudolycoriella porehu* sp. n. Abbreviation: ti = insertion of the tendon of the gonostylus adductor.

circular border and wider than half width of tibial apex; tibial organ consists of a patch of several robust bristles arranged in a transverse band. Fore tibia without robust bristles among vestiture. Mid tibia with three to five robust bristles among vestiture, located anteroventrally and posteroventrally. Hind tibia with four to seven robust bristles organised in a longitudinal, posteriodorsal row; on posterior side of hind tibia five to six robust bristles among vestiture. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** brown with dark setae. **Hypopygium** (Fig. 19). Gonocoxites wider than long, basal inner side of gonocoxites widely separated. Gonostylus short, broad, and slightly curved; 2.0–2.3 times longer than wide, apex blunt with an inner cavity; two robust spines present, the dorsal one located on a basal lobe; one long whip-lash hair is located on the ventral apex of the gonostylus. Tegmen broader than long, apicolaterally with two strongly sclerotized lobes, apex roundish with a small membranous edge; parameral apodeme robust and short to medium long. Area of teeth with ten to 15 small teeth. Ejaculatory apodeme dark, broad, and of medium length; base of ejaculatory apodeme pale, branches broad and basally connected. Posterior portion of gonocoxal apodeme medium sized and brown. Anterior portion of gonocoxal apodeme long and broad.

**Body size:** 1.9–2.5 mm.

**Female.** Unknown.

**Genetic distances.** No genetic information available.

**Etymology.** *Porehu* is a Māori modifier and means mysterious. It was chosen as the epithet because the taxonomic rank of these specimens remained unclear to the author for a long time.

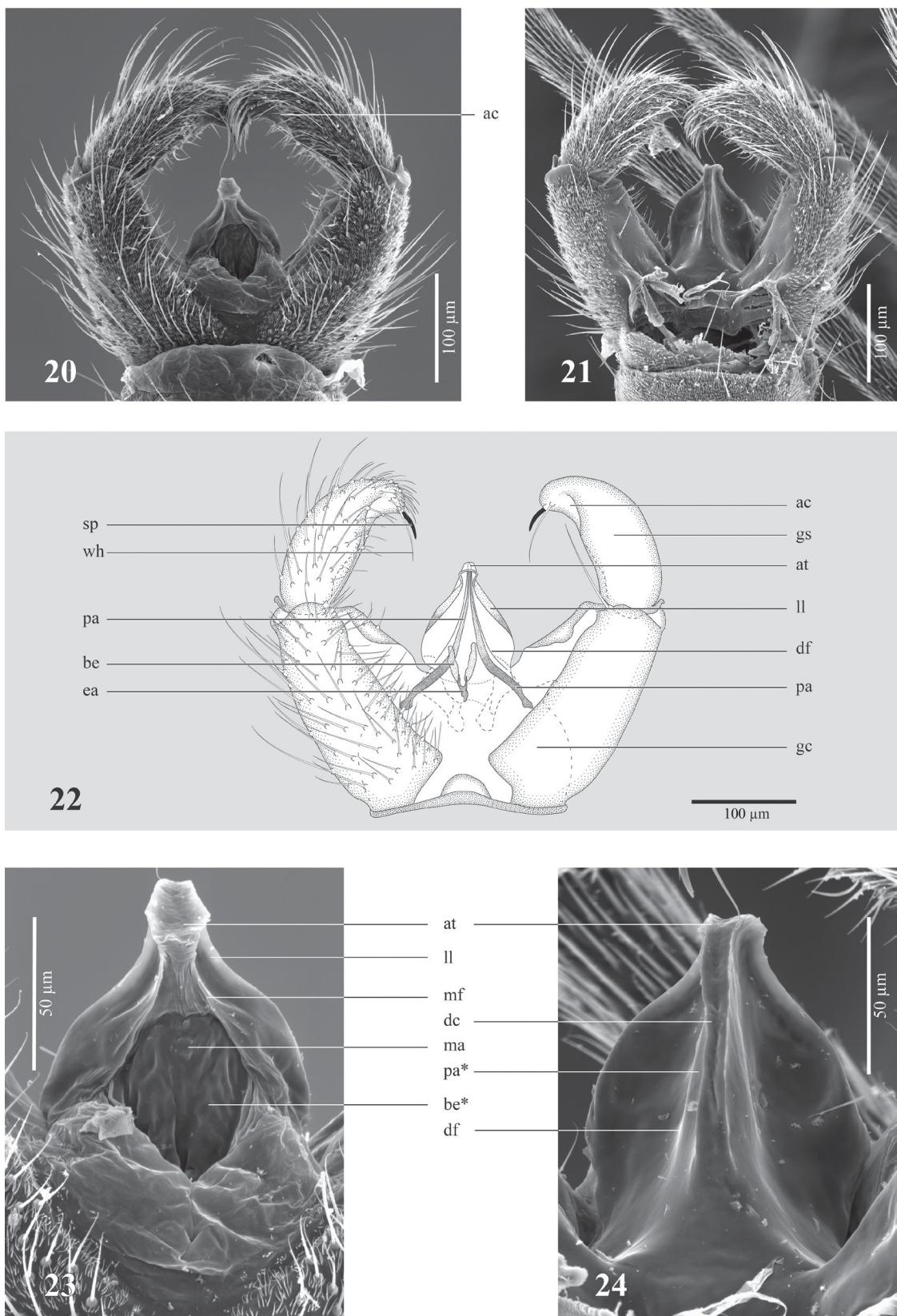
**Distribution.** New Zealand.

**Discussion.** See discussion paragraph for *Psl. orite*.

### ***Pseudolycoriella jejuna* complex**

The *Psl. jejuna* complex is a group of thirteen closely related and cryptic species. These species share a complex and synapomorph structure of their hypopygia. In Figures 20–22 a hypopygium of *Psl. tewaipounamu* is depicted. The gonostylus (gs) is elongated and curved with an inwardly bent apex. The apex possesses one spine (sp) and a whip-lash hair (wh) and—in most species—on the inward part a cavity (ac). The tegmen is highly derivative compared with the tegmen of typical sciarids. Its general shape is onion-shaped: more or less roundish with an apical contraction (at). Adjacent to the apical contraction the tegmen has two lateral lobes (ll) on the ventral side, which can easily be observed in light microscopy. In the middle of the ventral side of the tegmen a membranous area (ma) bordered by two median folds (mf) can easily be observed by using scanning electron microscopy. In light microscopy these delicate structures are hardly visible. At this membranous area a bulge of the base of the ejaculatory apodeme (be) can be observed. An area of teeth is absent. In light microscopy, the parameral apodemes (pa) do not fuse medially. Instead they are stretched to the apex of the tegmen and form the apical contraction (at). On the dorsal side of the tegmen the parameral apodemes protrude and form a dorsal carina (dc). This carina is bent around the apex and ends subapically on the ventral side of the tegmen. The bulges of the parameral apodemes are accompanied by a dorsal fold (df), which can also be observed in light microscopy. The phylogeny of this complex is shown in Figure 61.

**Discussion.** The species of the *Psl. jejuna* complex can be assigned to the *Psl. bruckii* group. The monophyly of this complex is strongly supported by genetics and can also be demonstrated by some autapomorphic morphological characters such as the extraordinary tegmen, the reduction of the number of gonostylar spines, and the secondary absence of an area of teeth. Due to this unique character set, all species of the *Psl. jejuna* complex can easily be recognized. Only *Psl. fuscorubroides* (Mohrig & Blasco-Zumeta) from Spain has a similar tegmen (Mohrig & Blasco-Zumeta 1996). It also possesses a dorsal carina that derives from the parameral apodemes. However, there are differences: the parameral apodemes are fused and not separated by a gap, as in the *Psl. jejuna* complex, and the carina in *Psl. fuscorubroides* arises vertically in the middle base of the tegmen. Furthermore, *Psl. fuscorubroides* possesses a large area of conspicuous teeth (Mohrig & Blasco-Zumeta 1996). Several other structures of the hypopygium are also dissimilar. For instance, the gonostylus of *Psl. fuscorubroides* is armed with two short spines and has a conspicuous lobe on the dorsal margin and therefore differs significantly from the gonostyli of the *Psl. jejuna* complex. It is not clear whether the dorsal carina of the tegmen is a convergent or a homologous character. Maybe *Psl. fuscorubroides* is closely related to the *Psl. jejuna* complex, but it certainly does not belong to the crown group of the *Psl. jejuna* complex, since the absence of an area of teeth can be regarded as a synapomorphy of the New Zealand *Psl. jejuna* complex.



**FIGURES 20–24.** *Pseudolycoriella jejuna* complex, *Pseudolycoriella tewaipounamu* sp. n., details of hypopygium. **20.** Hypopygium, ventral. **21.** Hypopygium, dorsal, tergite IX removed. **22.** Hypopygium, ventral. **23.** Tegmen, ventral. **24.** Tegmen, dorsal. Abbreviations: ac = apical cavity; at = apex of tegmen; be = base of ejaculatory apodeme; be\* = base of ejaculatory apodeme covered by the membranous area; dc = dorsal carina; df = dorsal fold; ea = ejaculatory apodeme; gc = gonocoxite; gs = gonostylus; ll = lateral lobe; ma = membranous area; mf = median fold; pa = parameral apodeme; pa\* = parameral apodeme covered by integument; sp = gonostylar spine; wh = whip-lash hair.

*jejuna* complex members. In other words, the hypothesis of a monophyly of the New Zealand representatives of the *Psl. jejuna* complex cannot be rejected.

The occurrence of two atavisms among the specimens of the *Psl. jejuna* complex confirms the above character polarisation regarding the single gonostylar tooth and the absence of the area of teeth. One paratype of *Psl. dagae* has two spines on the left gonostylus while the right one only bears one. This atavistic state is unique among all 233 investigated specimens belonging to the *Psl. jejuna* complex and indicates that the species of the *Psl. jejuna* complex derive from an ancestor that bears two spines at the gonostylus, like the extant species of the *Psl. bispina* complex or the *Psl. zealandica* complex. The second detected atavism occurred in two paratypes of *Psl. whena*, where an area of the teeth is present, although to a varying degree—one paratype shows only five tiny teeth, the other twelve.

### *Pseudolycoriella jejuna* (Edwards, 1927)

(Figs 25–29)

**Literature.** *Sciara jejuna* Edwards, 1927: Tonnoir & Edwards (1927): 796, Fig. 181.—Miller (1950): 57.—Steffan (1989): 150.—*Pseudolycoriella jejuna* (Edwards, 1927): Mohrig & Jaschhof (1999): 37–39, Fig. 19 a–g.—Menzel & Mohrig (2000): 715.—Rudzinski (2000): 183.—Macfarlane *et al.* (2010): 441.

**Material studied.** *Holotype male.* New Zealand: North Island, Manawatu-Wanganui, Ohakune, Oct.-Nov. 1923, leg. T.R. Harris (BMNH, BMNH(E)250339). *Previously published material:* 1♂ North Island, Far North, Waipoua Forest, 45 km northwest of Dargaville, old Kauri-*Podocarpus* wood, sweep net, 31.12.1992, leg. M. Jaschhof (PWMP). 2♂♂ North Island, Taupo, Hauhungaroa Range, 5 km southwest of Tihoi, *Podocarpus* wood with ground ferns, sweep net, 21.12.1992, leg. M. Jaschhof (PWMP; SDEI [Slide with the handwritten label: “Neuseeland: Nordins. / Pureora Forest / Kescher, Podocarpus / 21.12.92 / leg. Jaschhof”]. The locality information is obviously incorrect, because the sample locality and the date do not correspond with locality information in Mohrig & Jaschhof (1999).]. 2♂♂ North Island, Wairoa, Urewera National Park, Huiarau Range 30 km southeast of Murupara, altitude 600–1,000 m, *Podocarpus-Nothofagus* wood, sweep net, 23.12.1992, leg. M. Jaschhof (all PWMP). 1♂ North Island, Stratford, Mount Egmont National Park, East Egmont, altitude 650 m, *Podocarpus* wood with rotten wood and a dense layer of herbs, sweep net, 09.01.1993, leg. M. Jaschhof (PWMP). *New records:* 3♂♂ North Island, Taupo, Pureora Forest, Select Loop Road, 500 m, mixed mature podocarp forest, Malaise trap, 15.07–23.08.2001, leg. M. & C. Jaschhof (SDEI, SDEI-Dipt-0000579, SDEI-Dipt-0000583 & SDEI-Dipt-0000588). 1♂ North Island, Taupo, Pureora Forest Park, Waipapa Reserve, altitude 600 m, mixed podocarp/broadleaf forest, sweep net, 24–25.11.2002, leg. M. Jaschhof (SDEI). 2♂♂ North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest, sweep net, 03–04.02.2002, leg. M. Jaschhof (NZAC, SDEI-Dipt-0000773; SDEI, SDEI-Dipt-0000829). 8♂♂ same locality as previous, Malaise trap, 26.11–28.12.2002, leg. M. & C. Jaschhof & U. Kallweit (3x NZAC SDEI-Dipt-0000744 & SDEI-Dipt-0001195 & SDEI-Dipt-0001347; 5x SDEI, SDEI-Dipt-0000603, SDEI-Dipt-0000617, SDEI-Dipt-0001193 & SDEI-Dipt-0001339). 2♂♂ same locality as previous, sweep net, 26.11.2002, leg. M. Jaschhof (NZAC; SDEI).

**Redescription. Male.** **Head.** Head capsule brown. Eye bridge three facets wide, two facets at margin. Scape and pedicel mostly slightly paler than the flagellomeres; fourth flagellomere 2.7–3.3 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough with deep pits, sensilla of two different lengths, small ones and longer, curved sensilla; setae on the flagellomere as long as flagellomere width, slightly curved. Maxillary palp long and three-segmented, first palpomere longest, second one shortest; first palpomere with an inconspicuous patch of sensilla and three to five long bristles (exceptionally two), one bristle longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** brown, paler than head; some specimens with lateral brightened areas. Posterior pronotum bare. Anterior pronotum with two to six setae. Episternum 1 with four to eight setae. Mesonotum with four to six robust lateral bristles; row of dorsocentral bristles well developed; anteriorly on the mesonotum two to seven (median four) small arcostichal setae (Figs 28–29). Scutellum with four robust bristles (the inner ones longer than the outer two) and several minor setae. Katepisternum as long as high. **Wing.** Length 2.3–3.1 mm; width/length ratio 0.35–0.40. Membrane transparent, slightly shaded and without macrotrichia, anal area present; all posterior veins distinct, except faint stem of M, apical one-fifth to half of R<sub>5</sub> with macrotrichia on ventral and dorsal side; bM and r-m bare, exceptionally three specimens bearing one setae on r-m (in two cases only

on one wing),  $R_1$  0.8–1.2 times as long as  $R$ ; c/w ratio 0.75–0.82;  $r\text{-}m$  0.8–1.4 as long as  $bM$  (the holotype has an extraordinarily short  $r\text{-}m$  on the right wing, resulting in a  $r\text{-}m/bM$  ratio of 2.1). Haltere long and sooty brown; shaft longer than knob. **Legs** pale brown, paler than thorax, mid and hind coxae slightly darker than front coxae. Tibial organ surrounded by a circular border and as broad as half of the width of the tibial apex; tibial organ consists of an irregular row of bristles. Front tibia without robust bristles among the vestiture (exceptionally one specimen with one bristle among the vestiture). Mid tibia with one to three robust bristles among the vestiture (one specimen without robust bristles among vestiture). Posterior dorsal row of bristles inconspicuous, consisting of three to six bristles. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** brown, slightly paler than thorax, with long, dark setae. **Hypopygium** (Fig. 25). Gonocoxites wider than long, inner side of gonocoxites with medium sized setae, outer side with long setae; ventral, inner side of gonocoxites not fused basally. Gonostylus elongate and curved, 2.4–3.1 times longer than wide, apex differentiated, apex width varies between slender and broad (compare Figs 25 & 26), inner side of gonostylus concave and scattered with microtrichia; apex with one long spine and one whiplash hair. Tegmen of the typical ground plan of the *Psl. jejuna* complex, mostly onion-shaped (in some specimens more elongated), apical contraction broad; dorsal folds present; parameral apodeme basally strongly sclerotized, medially connected, posterior branches of the parameral apodemes nearly parallel. Area of teeth absent. Ejaculatory apodeme dark, broad, and long; base of ejaculatory apodeme very delicate, long, and slender (one specimen shows an exceptionally broad base [Fig. 27]). Posterior portion of gonocoxal apodeme medium sized and brown, medially fused. Anterior portion of gonocoxal apodeme long and dark brown.

**Body size:** 2.5–3.3 mm.

**Female.** A female paratype (BMNH(E)250340, BMNH) was designated by Tonnoir & Edwards (1927) and described by Menzel & Mohrig (2000). This type is not included in the present study.

**Genetic distances.** The maximum p-distance between all eight available COI sequences is 2.75%. The nearest neighbour is *Psl. teo*, diverging by a minimum of 7.55%. All ten available 28S sequences are identical. The nearest neighbour is *Psl. dagae*, diverging by a minimum of 0.75%.

**Distribution.** New Zealand.

**Remarks.** Although Menzel & Mohrig (2000) gave an accurate redescription of *Psl. jejuna*, some details have to be amended. These authors stated that *Psl. jejuna* possesses an area of teeth twice as high as broad, with long single-pointed teeth (Menzel & Mohrig, 2000). This could not be verified because an area of teeth could not be observed in the holotype or in any other investigated specimen. Just two paratypes of another species of this complex—*Psl. whena*—show an atavistic area of teeth (see discussion of *Psl. jejuna* complex). Moreover, Menzel & Mohrig (2000) gave a lower value for the body length of *Psl. jejuna* than measured in the present study (2.2 mm vs. 2.5–3.3 mm). Maybe this is a result of measuring the shrunken holotype without taking the length of the hypopygium into account. The holotype of *Psl. jejuna* has an extraordinary ratio of the length of the wing vein  $r\text{-}m$  and  $bM$ . On the right wing the  $r\text{-}m/bM$  ratio is 2.1 and on the left wing 1.8. The  $r\text{-}m/bM$  ratio of the newly examined specimens ranges from 0.8 to 1.4.

### *Pseudolycoriella tuakana* sp. n.

(Figs 30–34)

urn:lsid:zoobank.org:act:NomenclaturalActs/9392599F-A28F-4DCC-B7AF-C558BCBCFCEB

**Material studied.** *Holotype male.* New Zealand: North Island, Manawatu-Wanganui, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest, Malaise trap, 26.11–28.12.2002, leg. M. & C. Jaschhof & U. Kallweit (NZAC, SDEI-Dipt-0001194). *Paratype.* 1♂ same locality and same date as holotype (SDEI, SDEI-Dipt-0001337).

**Description. Male.** **Head.** Head capsule brown. Eye bridge three facets wide, two facets at margin. Scape and pedicel slightly paler than the flagellomeres; fourth flagellomere 2.8–2.9 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough with deep pits, sensilla of two different lengths, small ones and longer, curved sensilla; setae on the flagellomere as long as flagellomere width, slightly curved. Maxillary palp long and three-segmented, first palpomere longest, second one shortest; first palpomere with an inconspicuous patch of sensilla and two to four long bristles, one of these bristles longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** brown, concolourous with head; laterally extensively brighter. Posterior pronotum bare. Anterior pronotum with five setae. Episternum 1 with three to four setae. Mesonotum with four to five robust lateral

bristles; row of dorsocentral bristles well developed; anteriorly on the mesonotum a patch of nine closely arranged arcostichal setae (Figs 33–34). Scutellum with three to four robust bristles and several minor setae. Katepisternum as long as high. **Wing.** Length 2.7–2.9 mm; width/length ratio 0.39–0.40. Membrane transparent, slightly shaded and without macrotrichia, anal area present; all posterior veins distinct, except faint stem of M, apical third of  $R_s$  with macrotrichia on ventral and dorsal side; bM and r-m bare (the paratype bears on the right wing setae on r-m),  $R_1$  1.0–1.1 times as long as R; c/w ratio 0.77–0.80; r-m 1.1–1.3 as long as bM. Haltere long and sooty brown; shaft longer than knob. **Legs** pale brown, mid and hind coxae slightly darker than fore coxae. Tibial organ surrounded by a circular border and slightly narrower than half width of tibial apex; tibial organ consists of an irregular row of bristles. Front tibia without robust bristles among the vestiture (the holotype bears on the left tibia one bristle among vestiture). Mid tibia without bristles among vestiture. Posteriodorsal row of bristles very inconspicuous, consisting of two to three bristles. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** brown, slightly paler than thorax, with long, dark setae. **Hypopygium** (Fig. 30). Gonocoxites wider than long, inner side of gonocoxites with medium sized setae, outer side with long setae; ventral, inner side of gonocoxites basally not fused. Gonostylus elongate and curved, 2.9–3.0 times longer than wide, apex slightly differentiated, inner side of gonostylus concave and with scattered microtrichia; apex with one medium-sized spine that is only slightly longer than the surrounding setae (Figs 30 & 31); one whip-lash hair present. Tegmen of the typical ground plan of the *Psl. jejuna* complex, onion-shaped but elongated, apical contraction broad; dorsal folds well developed; parameral apodemes basally strongly sclerotized, median connected, posterior branches of the parameral apodemes nearly parallel and close. Area of teeth absent. Ejaculatory apodeme dark, broad, and short; base of ejaculatory apodeme very delicate, long, and broad. Posterior portion of gonocoxal apodeme medium sized and brown, medially joined. Anterior portion of gonocoxal apodeme of medium length and dark brown.

**Body size:** 3.0–3.2 mm.

**Female.** Unknown.

**Genetic distances.** Both available COI sequences are identical and do not show any p-distance. The nearest neighbour is *Psl. dagae*, diverging by a minimum of 5.93%. Both available 28S sequences are identical. The nearest neighbour is *Psl. dagae*, diverging by a minimum of 0.11%.

**Etymology.** The Māori word *tuakana* means elder brother or elder sister. Thus, the epithet refers to the close relationship of the new species to *Psl. jejuna*.

**Distribution.** New Zealand.

**Discussion.** Superficially *Psl. tuakana* is identical to *Psl. jejuna* and they would be regarded as conspecific, if the genetic analysis did not show a considerable difference between the species (Fig. 61). Given that both type specimens of *Psl. tuakana* originated from the same collection locality as *Psl. jejuna* the existence of one single species with two distinct genetic variants is highly unlikely. A subsequent closer examination revealed some slight morphological differences. Nevertheless, these have to be interpreted carefully in the light of the small number of specimens of *Psl. tuakana*, which does not enable a robust statistical analysis. *Pseudolycoriella tuakana* does not have any bristles among the vestiture on the mid tibia; while 21 out of 22 specimens of *Psl. jejuna* bear one to two (exceptionally three) bristles on the mid tibia. The spine on the gonostylus is shorter in *Psl. tuakana* (Fig. 35a) and therefore does not protrude from the surrounding setae as in *Psl. jejuna*. Another difference is the longer ejaculatory apodeme in *Psl. jejuna* (Fig. 35c). Nevertheless, there are exceptions: one specimen of *Psl. jejuna* (SDEI-Dipt-0000588) has an aberrant short ejaculatory apodeme (Fig. 27). The following weaker differences have more auxiliary character. The number of arcostichal bristles on the mesonotum differs between the species. *Pseudolycoriella jejuna* has two to seven arcostichal bristles while *Psl. tuakana* has nine (Figs 28, 29, 33, 34 & 36). The length to width ratio of the gonostylus of both species might show different median values, but a huge overlap has to be considered (Fig. 35b). Additionally, the tegmen of most *Psl. jejuna* specimens is more rounded while the tegmen of *Psl. tuakana* is more tapered.

### *Pseudolycoriella dagae* sp. n.

(Figs 1 & 42)

urn:lsid:zoobank.org:act:8C8A28A2-ADE2-4D2F-9D16-01A2A4F788F2

**Literature.** *Pseudolycoriella jejuna* (Edwards, 1927); Mohrig & Jaschhof (1999): 37 [misidentification].

**Material studied.** *Holotype male.* New Zealand: North Island, Western Bay of Plenty, Katikati, 449 Lund Road, Malaise trap, 25.07–08.08.2016, leg. P.A. Maddison (NZAC, SDEI-Dipt-0000679). *Paratypes.* 3♂♂ same locality

and same date as holotype (1x NZAC, SDEI-Dipt-0001249; 2x SDEI, SDEI-Dipt-0000628 & SDEI-Dipt-0000655). 1♂ North Island, Western Bay of Plenty, Katikati, Te Mania catchment, Malaise trap, 19.09–27.10.2016, leg. P.A. Maddison (NZAC, SDEI-Dipt-0001367). 1♂ North Island, Wairoa, Urewera National Park, Huiarau Range 30 km southeast of Murupara, altitude 600–1,000 m, *Podocarpus-Nothofagus* wood, sweep net, 23.12.1992, leg. M. Jaschhof (SDEI [previously misidentified, published as *Psl. jejuna* in Mohrig & Jaschhof 1999]). 1♂ South Island, Kaikoura, Blue Duck Reserve, altitude 300–400 m, mixed podocarp-*Nothofagus solandri* forest, Malaise trap, 12.05–09.06.2001, leg M. & C. Jaschhof (SDEI).

**Description.** **Male.** **Head.** Head capsule brown. Eye bridge three to four facets wide. Scape and pedicel yellow, strongly contrasting with the dark brown flagellomeres; fourth flagellomere (Fig. 1) 2.8–3.3 times longer than wide; necks of flagellomeres well differentiated and pale; surface of flagellomeres rough with deep pits, sensilla of two different lengths, small ones and longer, curved sensilla; setae on the flagellomere longer than flagellomere width, slightly curved. Maxillary palp long and three-segmented, first and third palpomeres of equal length, second one shortest, oval; first palpomere with long sensilla and two to five long bristles, one bristle longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** as brown as head, lateral and frontal parts brightened. Posterior pronotum bare. Anterior pronotum with two to three setae. Episternum 1 with four to ten setae. Mesonotum with five to seven robust lateral bristles. Scutellum with three to four robust bristles and several minor setae. Katepisternum as long as high. **Wing.** Length 2.5–3.1 mm; width/length ratio 0.38–0.40. Membrane transparent, slightly shaded and without macrotrichia, anal area present; all posterior veins distinct, except faint stem of M, apical 40–67% of  $R_5$  with macrotrichia on ventral and dorsal side (exceptionally: one paratype with macrotrichia only on the dorsal side); bM bare, the holotype and two paratypes bear one seta on r-m, the remaining three paratypes with a bare r-m;  $R_1$  0.7–1.0 times as long as R; c/w ratio 0.70–0.74; r-m 1.0–1.4 as long as bM. Haltere long and sooty brown; head of haltere longer than shaft. **Legs** pale brown, paler than thorax, mid and hind coxae slightly darker than front coxae. Tibial organ surrounded by a circular border and slightly wider than half width of tibial apex; tibial organ consists of an irregular row of bristles. Front tibia without robust bristles among vestiture. Mid tibia with one to three robust bristles among vestiture. Posterior dorsal row of bristles inconspicuous. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** brown, slightly paler than thorax, with long, dark setae. **Hypopygium** (Fig. 42). Gonocoxites wider than long, inner side of gonocoxites with medium sized setae, outer side with long setae; ventral, inner side of gonocoxites basally separated. Gonostylus elongated and curved, 2.8–3.2 times longer than wide, apex not well differentiated, inner side strongly concave, apical cavity with some microtrichia, remaining inner side with several microtrichia, one spine (exceptionally one paratype [SDEI-Dipt-0000655] with two gonostylar spines on the right gonostylus) and one whip-lash hair present, inner base of gonostylus with a conspicuous angle (*ba* in Fig. 42). Tegmen of the typical ground plan of the *Psl. jejuna* complex, onion-shaped, apical contraction broad; dorsal folds present; parameral apodemes basally strongly sclerotized, median connected. Area of teeth absent. Ejaculatory apodeme dark, broad, and long; base of ejaculatory apodeme pale, long, in some specimens y-shaped. Posterior portion of gonocoxal apodeme medium sized and brown, medial joined. Anterior portion of gonocoxal apodeme long and dark brown.

*Body size:* 2.5–3.2 mm.

*Female.* Unknown.

**Genetic distances.** All five available COI sequences are identical and do not show any pairwise distance. The nearest neighbour is *Psl. tuakana*, diverging by a minimum of 5.93%. The p-distance between both available 28S sequences is 0.06%. The nearest neighbour is *Psl. tuakana*, diverging by a minimum of 0.11%.

**Etymology.** The epithet *dagae* is an anagram of the German abbreviation of the *German Society of general and applied Entomology* (*DGaaE*).

**Distribution.** New Zealand.

**Discussion.** *Pseudolycoriella dagae* is one of three species of this complex which have a yellowish scape and pedicel strongly contrasting with a dark flagellum. Another of those—*Psl. porotaka*—has a much shorter length/width ratio of the fourth flagellomere (2.3–2.4 vs. 2.8–3.3 in *Psl. dagae*) and a much narrower ejaculatory apodeme. The remaining species—*Psl. raki*—can be distinguished by a more slender gonostylus shape, which manifests itself in a larger length to width ratio of the gonostylus (2.8–3.2 vs. 2.4–2.6 in *Psl. dagae*). In practice, however, discrimination between these two species can be as challenging as in *Psl. jejuna* and *Psl. tuakana*. In particular, preparations in which the gonostylus has not been mounted in a perfect ventral view can lead to misidentifications. A helpful additional character is a bulging basal angle at the inner base of gonostylus, which is well developed in *Psl. dagae* (Fig. 42) and absent or less conspicuous in *Psl. raki*. With respect to the wing, there are two other slight differences:

*Psl. dagae* has macrotricha on both the dorsal and ventral side for more than the apical half of vein  $R_5$ , while in *Psl. raki* this double-sided setosity is limited to a maximum of the apical two-fifths of  $R_5$ . The c/w ratio of *Psl. dagae* is equal to or less than 0.74, while in *Psl. raki* it is equal to or greater than 0.74. Another slight difference, which should be treated with caution: the antepronotum of *Psl. dagae* bears 2–3 setae while that of *Psl. raki* bears 3–8 setae. One paratype of *Psl. dagae* has two gonostylar spines on the right gonostylus, which is regarded as an atavism (see *Psl. jejuna* complex discussion).

### *Pseudolycoriella raki* sp. n.

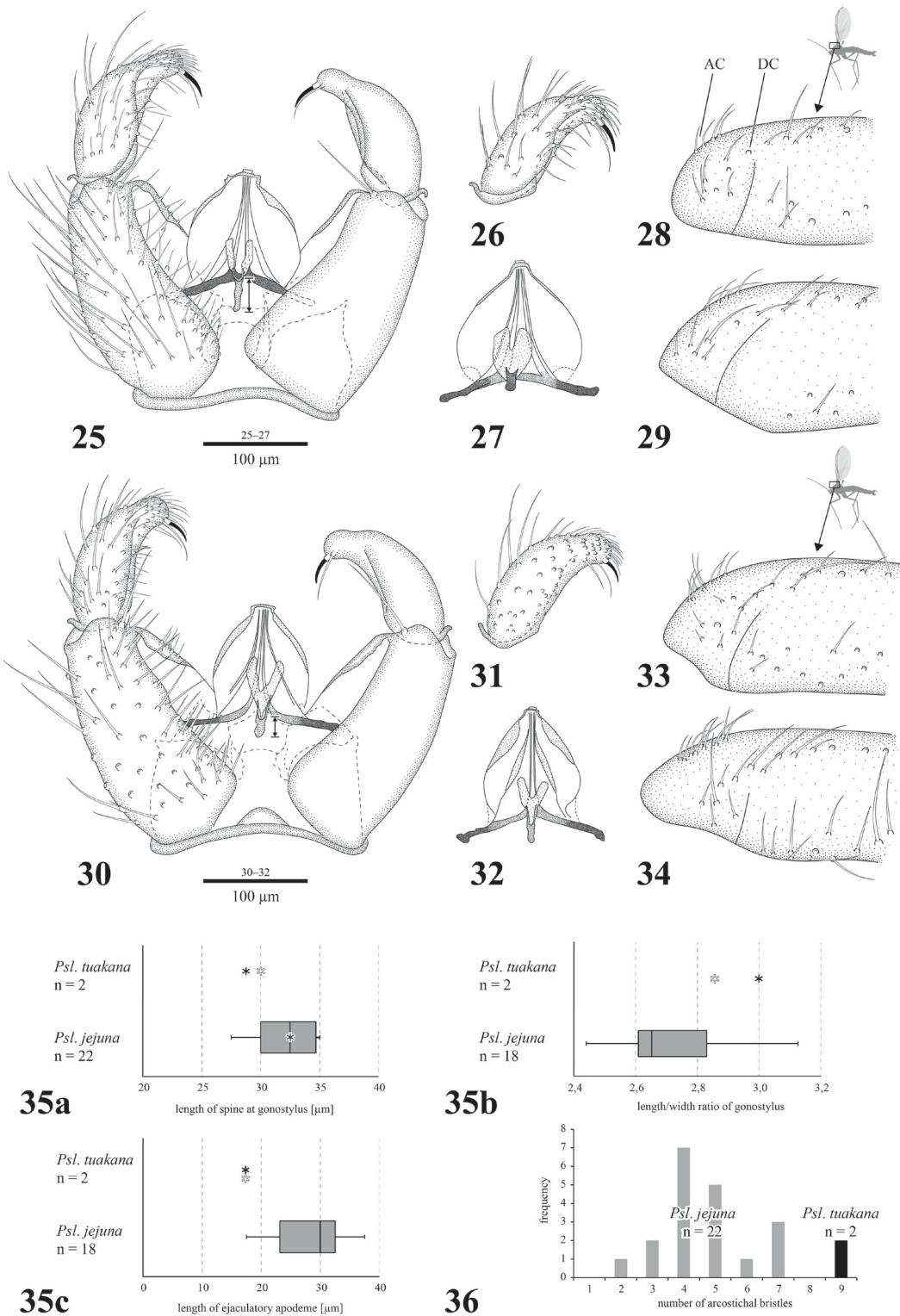
(Fig. 41)

urn:lsid:zoobank.org:act:NomenclaturalActs/01500E3C-735A-400F-968D-3B3E1F4A14C9

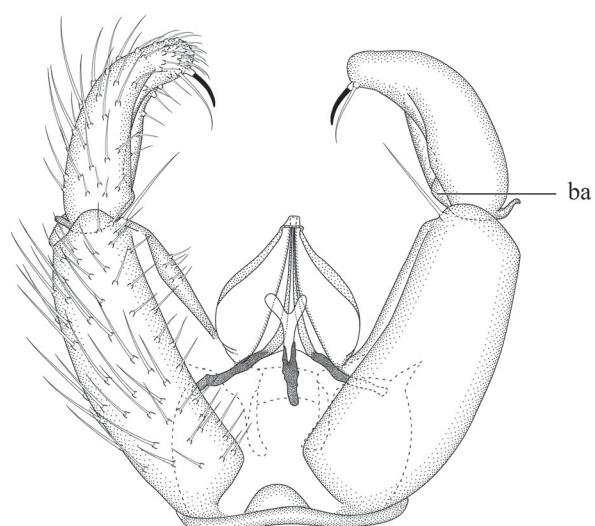
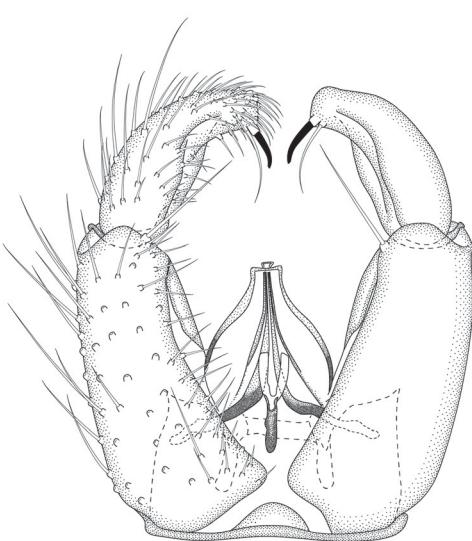
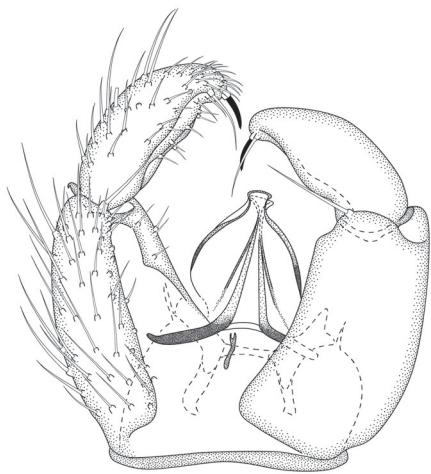
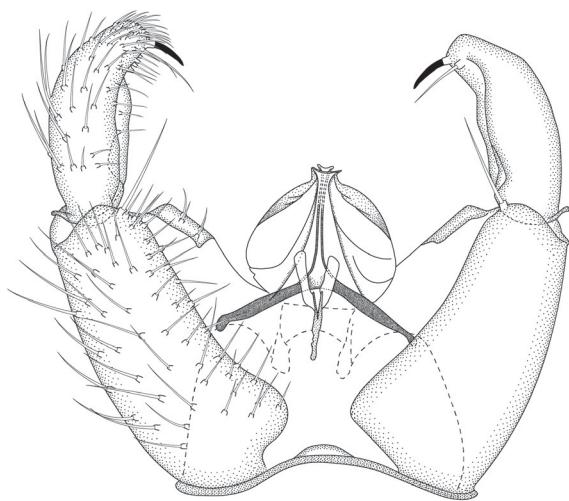
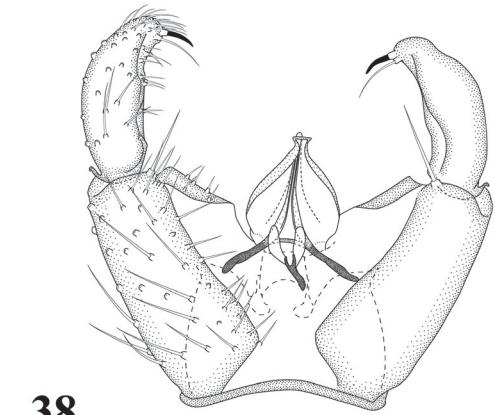
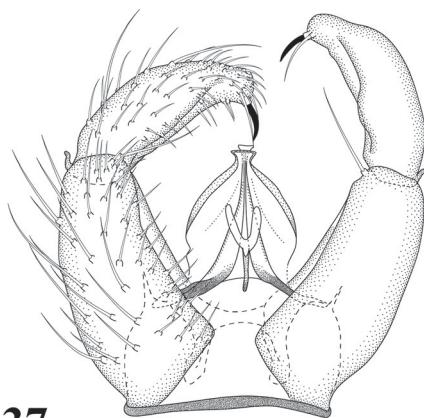
**Literature.** *Pseudolycoriella jejuna* (Edwards, 1927): Mohrig & Jaschhof (1999): 37 [misidentification].—Köhler & Mohrig (2016): 108 [misidentification].

**Material studied.** *Holotype male*. New Zealand: North Island, Far North, Waipoua Forest, alongside Highway 12, altitude 300 m, mixed mature Kauri/podocarp forest, Malaise trap, 24.07–17.08.2001, leg. M. & C. Jaschhof (NZAC, SDEI-Dipt-0000834). *Paratypes*. 3♂ same locality and same date as holotype (1x NZAC; 2x SDEI). 1♂ North Island, Far North, Puketi Forest, Waipapa River Valley, mixed secondary wood of Kauri and *Podocarpus* with tree fern, sweep net, 01–02.01.1993, leg. M. Jaschhof (PWMP [previously misidentified, published as *Psl. jejuna* in Mohrig & Jaschhof 1999]). 1♂ North Island, Thames-Coromandel, Coromandel Range, 5 km east of Coromandel, dense *Podocarpus* secondary wood with tree ferns, sweep net, 28.12.1992, leg. M. Jaschhof (PWMP [previously misidentified, published as *Psl. jejuna* in Mohrig & Jaschhof (1999)]). 1♂ North Island, Whakatane-Distrik, White Pine Bush 3 km southwest of Whakatane, *Podocarpus* wood, sweep net, 26.12.1992, leg. M. Jaschhof (PWMP [previously misidentified, published as *Psl. jejuna* in Köhler & Mohrig 2016]).

**Description. Male.** **Head.** Head capsule brown. Eye bridge three to four facets wide. Scape and pedicel bright yellow, strongly contrasting with the brown flagellum; fourth flagellomere 2.6–3.4 times longer than wide; necks of flagellomeres well differentiated, paler than body of flagellomeres, flagellomere necks at antenna apex show distal dark rings; surface of flagellomeres rough with deep pits, sensilla of two different lengths, small ones and longer, curved sensilla; setae on the flagellomere longer than the flagellomere width, slightly curved, arising from small elevations; apical flagellomeres very rough with prominent elevations. Maxillary palp very long and three-segmented, first or third palpomere longest, second one shortest; first palpomere with long sensilla and four to five long bristles, one bristle longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** pale brown, slightly paler than head, with some indistinct lateral brightening. Posterior pronotum bare. Anterior pronotum with three to eight setae. Episternum 1 with two to eight setae. Mesonotum with four to five robust lateral bristles. Scutellum with three to four robust bristles and several minor setae. Katepisternum as long as high. **Wing.** Length 2.2–2.9 mm; width/length ratio 0.38–0.41. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, except faint stem of M, apical fifth to two-fifths of  $R_5$  with macrotrichia on ventral and dorsal side; bM and r-m bare;  $R_1$  0.8–1.0 times as long as R; c/w ratio 0.74–0.79; r-m 0.8–1.2 as long as bM. Haltere brownish; head of haltere slightly longer than shaft. **Legs** yellowish pale brown, paler than thorax. Tibial organ surrounded by a circular border and wider than half of the width of the tibial apex; tibial organ consists of an irregular row of bristles. Fore tibia with one robust bristle among the vestiture, or without. Mid tibia with one to three robust bristles among the vestiture. Posterior dorsal row of seven to eleven bristles occupies half to two-thirds of the apex of the tibia. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** concolourous with thorax, with long, dark setae. **Hypopygium** (Fig. 41). Gonocoxites wider than long, inner side of gonocoxites with small setae, outer side with long setae; ventral, inner side of gonocoxites basally separated. Gonostylus curved and slender, 2.4–2.6 times longer than wide, apex not clearly separated, apical end broad, blunt, on ventral side with a huge apical cavity scattered with few microtrichia, one spine and one whip-lash hair present, inner base of gonostylus without or only with a minor angle. Tegmen of the typical ground plan of the *Psl. jejuna* complex, onion-shaped but more elongated than in *Psl. jejuna*; dorsal folds present; parameral apodeme basally strongly sclerotized, distal branches forming a triangle. Area of teeth absent. Ejaculatory apodeme dark, broad and long; base of ejaculatory apodeme delicate, long, u-shaped. Posterior portion of gonocoxal apodeme medium sized and brown, joined medially. Anterior portion of gonocoxal apodeme long and dark brown, widely separated.



**FIGURES 25–36.** *Pseudolycoriella jejuna* complex, *Pseudolycoriella jejuna* (Edwards) and *Pseudolycoriella tuakana* sp. n. **25.** *Psl. jejuna* (SDEI-Dipt-0000583), hypopygium. **26.** *Psl. jejuna* (SDEI-Dipt-0000603), gonostylus. **27.** *Psl. jejuna* (SDEI-Dipt-0000583), tegmen with aberrant ejaculatory apodeme. **28.** *Psl. jejuna* (SDEI-Dipt-0000603), mesonotum. **29.** *Psl. jejuna* holotype, mesonotum. **30.** *Psl. tuakana* holotype, hypopygium. **31.** *Psl. tuakana* paratype, gonostylus. **32.** *Psl. tuakana* paratype, tegmen. **33.** *Psl. tuakana* holotype, mesonotum (lateral view). **34.** *Psl. tuakana* paratype, mesonotum (lateral view). **35a.** Comparison of the length of gonostylar spine of both species; values for holotypes are indicated by black asterisks. **35b.** Comparison of the length-width ratio of gonostylus of both species; values for holotypes are indicated by black asterisks. **35c.** Comparison of the length of ejaculatory apodeme of both species; values for holotypes are indicated by black asterisks. **36.** Histogram of arcostichal bristles of both species. Abbreviations: AC = arcostichal bristles; DC = dorsocentral bristles.



**FIGURES 37–42.** *Pseudolycoriella jejuna* complex, hypopygia. 37. *Pseudolycoriella sudhausi* sp. n. 38. *Pseudolycoriella whena* sp. n. 39. *Pseudolycoriella porotaka* sp. n. 40. *Pseudolycoriella nahenahe* sp. n. 41. *Pseudolycoriella raki* sp. n. 42. *Pseudolycoriella dagae* sp. n. Abbreviation: ba = basal angle.

**Body size:** 2.3–2.9 mm.

**Female.** Unknown.

**Genetic distances.** Only one specimen was successfully sequenced. For the COI sequence, the nearest neighbour is *Psl. tuakana*, diverging by a minimum of 8.42%. For the 28S sequence the nearest neighbour is also *Psl. tuakana*, diverging by a minimum of 0.44%.

**Etymology.** *Raki* is the Māori word for northern.

**Distribution.** New Zealand.

**Discussion.** See discussion paragraph for *Psl. dagae*.

### ***Pseudolycoriella hauta* sp. n.**

(Figs 9 & 44)

urn:lsid:zoobank.org:act:0B34C8C6-9E06-40BA-8731-229742E97203

**Material studied.** *Holotype male.* New Zealand: South Island, Clutha, Catlins, Purakaunui Scenic Reserve, mixed podocarp/broadleaf/*Nothofagus* forest, Malaise trap, 27.01–05.03.2002, leg. M. & C. Jaschhof (NZAC, SDEI-Dipt-0001134). *Paratypes.* 3♂♂ same locality and same date as holotype (1x NZAC, SDEI-Dipt-0001137; 2x SDEI, SDEI-Dipt-0000506 & SDEI-Dipt-0001142).

**Description. Male.** **Head.** Head capsule dark brown, laterally with several longer setae among the normal setosity. Eye bridge three to four facets wide. Scape and pedicel slightly paler brown than the flagellum; fourth flagellomere 2.5–2.8 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough with deep pits, sensilla of two different lengths, small ones and longer, curved sensilla; setae on the flagellomere longer than flagellomere width, curved. Maxillary palp long and three-segmented, first palpomere is the longest, second one shortest; first palpomere with long sensilla and two to six long bristles, one bristle longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** brown, mesonotum slightly darker. Posterior pronotum bare. Anterior pronotum with five to seven long and middle-sized setae. Episternum 1 with seven to nine long and medium sized setae. Mesonotum with six to seven robust lateral bristles. Scutellum with five to six robust bristles and several minor setae. Long dorsocentral bristles forming a complete row on the mesonotum. Katepisternum as long as high. **Wing** (Fig. 9). Length 2.6–2.8 mm; width/length ratio 0.33–0.39. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, apical 33–50% of  $R_s$  with macrotrichia on ventral and dorsal side; bM bare, r-m with 1–3 macrotrichia (exceptionally r-m on one wing of one paratype bare);  $R_1$  0.6–0.7 times as long as  $R$ ; c/w ratio 0.70–0.75; r-m 0.7–0.9 as long as bM. Haltere brownish; head of haltere slightly longer than shaft. **Legs** brown, coxae as brown as thorax. Tibial organ surrounded by a circular border and as wide as half width of tibial apex; tibial organ consists of more than ten bristles arranged in an irregular row. Front tibia without robust bristle among vestiture. Mid tibia with one or two slightly robust bristles among vestiture. Posterior row of five to eight bristles mainly on middle of hind tibia. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** brown, paler than thorax, with long, dark setae. **Hypopygium** (Fig. 44). Gonocoxites wider than long, inner side of gonocoxites with short setae, outer side with long setae; ventral, inner side of gonocoxites basally separated. Gonostylus slender, 2.7–3.3 times longer than wide, apical third curved inward, not distinctly delimited; inner side concave; apical cavity long and remaining inner side without microtrichia, ventral margin distinct; one spine present, located at the apex; long whip-lash hair present. Tegmen of the typical ground plan of the *Psl. jejuna* complex, with an acuminate basic shape; dorsal folds present; parameral apodemes basally strongly sclerotized, medially connected. Area of teeth absent. Ejaculatory apodeme short and dark, base of ejaculatory apodeme pale brown. Posterior portion of gonocoxal apodeme medium sized and brown, joined medially. Anterior portion of gonocoxal apodeme of medium-length and dark brown.

**Body size:** 2.7–3.2 mm.

**Female.** Unknown.

**Genetic distances.** All four available COI sequences are identical and do not show any pairwise distance. The nearest neighbour is *Psl. tewaipounamu*, diverging by a minimum of 8.68%. The nearest neighbour of the only available 28S sequence is *Psl. tewaipounamu*, diverging by a minimum of 0.17%.

**Etymology.** *Hauta* is the Māori word for south. The name for this new species reflects the southern distribution of this species.

**Distribution.** New Zealand.

**Discussion.** Among the species of the *Psl. jejuna* complex examined during this study, *Psl. hauta* has the most developed setosity on the mesonotum, the anterior pronotum, the episternum 1, and the scutellum. Furthermore, the shape of the gonostylus is unique and allows a clear delimitation from the other species of the complex. The spine on the gonostylus lies at the inner angle of the gonostylus apex and is more apically located than in all the other species. Another distinguishing feature is the prominent ventral margin. Due to the more concave inner side of the gonostylus the ventral margin is more obvious than in the related species.

***Pseudolycoriella jejunella* sp. n.**

(Figs 2, 6, 8 & 46)

urn:lsid:zoobank.org:act:06EB5442-74EE-4676-A0C1-2CC6F04C7EF9

**Material studied.** *Holotype male.* New Zealand: South Island, Southland, Fiordland, Fiordland NP, Hollyford River Valley, Moraine Creek Track, mixed podocarp/*Nothofagus* forest, Malaise trap, 05–24.01.2002, M. & C. Jaschhof (NZAC, SDEI-Dipt-0000880). *Paratypes.* 1♂ same locality and same date as holotype (SDEI, SDEI-Dipt-0000935). 1♂ South Island, Southland, Otago Lakes, Fiordland NP, Hollyford River Valley S Divide Creek, mixed *Nothofagus*/broadleaf forest, Malaise trap, 06–24.01.2002, M. & C. Jaschhof (SDEI).

**Description. Male.** **Head.** Head capsule brown, concolourous with thorax. Eye bridge one to three facets wide. Scape and pedicel not paler brown than the flagellum; fourth flagellomere (Fig. 2) 1.9–2.3 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough with deep pits, sensilla of two different lengths, small ones and longer, curved sensilla; setae on the flagellomere as long as flagellomere width, slightly curved. Maxillary palp (Fig. 6) short and three-segmented, first palpomere is the longest, third one shortest, first palpomere with long sensilla and three to four long bristles, one bristle longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** brown, mesonotum slightly darker. Posterior pronotum bare. Anterior pronotum with four setae. Episternum 1 with five setae. Mesonotum with five robust lateral bristles. Scutellum with two robust bristles and several minor setae. Katepisternum as long as high. **Wing.** Length 2.0–2.1 mm; width/length ratio 0.38–0.41. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, stem of M weak; apical 33–40% of  $R_s$  with macrotrichia on ventral and dorsal side; r-m and bM without macrotrichia;  $R_1$  approximately 0.6–0.7 times as long as R; c/w ratio 0.7; r-m 1.2–1.8 as long as bM. Haltere brownish; head of haltere as long as shaft. **Legs** brownish, coxae as brown as thorax. Tibial organ surrounded by a circular border and as wide as half width of tibial apex; tibial organ (Fig. 8) consists of approximately eight bristles arranged in an irregular row. Front tibia without robust bristles among the vestiture. Mid tibia with one or two slightly robust bristles. Posterior dorsal row of bristles on hind tibia present but inconspicuous. All tibial spurs equal in length. Claws with five robust teeth. **Abdomen** brown, concolourous with thorax; with long, dark setae. **Hypopygium** (Fig. 46). Gonocoxites wider than long, inner side of gonocoxites with short setae, outer side with long setae; ventral, inner side of gonocoxites basally separated. Gonostylus slender, 3.0–3.4 times longer than wide; apical fourth kinked inwards, apical cavity present, but inconspicuous, scattered with some microtrichia; one spine present, located subapically, medium long whip-lash hair present. Tegmen of the typical ground plan of the *Psl. jejuna* complex, with an acuminate basic shape; the dorsal folds strikingly developed; parameral apodemes basally strongly sclerotized. Area of teeth absent. Ejaculatory apodeme short and dark, base of ejaculatory apodeme not visible. Posterior portion of gonocoxal apodeme medium sized and brown, joined medially. Anterior portion of gonocoxal apodeme short and dark brown.

*Body size:* 1.9–2.5 mm.

*Female.* Unknown.

**Genetic distances.** Both available COI sequences are identical and do not show any distance. The nearest neighbour is *Psl. maddisoni*, diverging by a minimum of 10.79%. The nearest neighbour of the single available 28S sequence is *Psl. whakahara*, diverging by a minimum of 0.24%.

**Etymology.** The epithet *jejunella* is the diminutive of *jejuna*, and refers to the smallness of the new species compared with *Psl. jejuna*.

**Distribution.** New Zealand.

**Discussion.** By its small body and wing length *Psl. jejunella* can be easily separated from most other species of this complex. Only specimens of *Psl. whena* and small specimens of *Psl. sudhausi* are similarly small. In addition, the structure of the gonostylus is unique in this complex. With a gonostylar index of 3.0–3.4, the gonostylus of *Psl.*

*jejunella* is more slender than in most other species. Only some individuals of *Psl. dagae* and *Psl. hauta* lie in this range. Furthermore, the gonostylus appears more tubular and does not show the typical cavity on the inner basal side, and the spine on the gonostylus is more subapically located than in other species.

### ***Pseudolycoriella maddisoni* sp. n.**

(Fig. 47)

urn:lsid:zoobank.org:act:FB0BF871-1F03-4675-AF10-AFC8DCB8C269

**Material studied.** *Holotype male.* New Zealand: North Island, Western Bay of Plenty, Katikati, 449 Lund Road, Malaise trap, 25.07–08.08.2016, leg. P.A. Maddison (NZAC, SDEI-Dipt-0000627). *Paratypes.* 2♂♂ North Island, Western Bay of Plenty, Katikati, Te Mania catchment, Malaise trap, 19.09–27.10.2016, leg. P.A. Maddison (SDEI, SDEI-Dipt-0000664 & SDEI-Dipt-0001369).

**Description. Male.** **Head.** Head capsule brown, slightly darker than thorax. Eye bridge two to three facets wide. Scape and pedicel pale brown, slightly paler than the flagellum; fourth flagellomere 2.7 times longer than wide (flagella are missing in both paratypes); necks of flagellomeres well differentiated, bright; surface of flagellomeres rough with deep pits, sensilla of two different lengths, small ones and longer, curved sensilla; setae on the flagellomere as long as flagellomere width, slightly curved. Maxillary palp long and three-segmented, first palpomere is the longest, second is shortest, first palpomere with long sensilla and four to six long bristles, one bristle longer and more robust, located on the outer side. Prefrons and clypeus bulging. **Thorax** dark brown. Posterior pronotum bare. Anterior pronotum with four to six setae. Episternum 1 with four to seven setae. Mesonotum with four to five robust lateral bristles. Scutellum with two to three robust bristles and several minor setae. Katepisternum as long as high. **Wing.** Length 2.5–2.7 mm; width/length ratio 0.38–0.42. Membrane transparent, slightly shaded and without macrotrichia, anal area present; all posterior veins distinct, stem of M weak; apical 40–50% of  $R_5$  with macrotrichia on both ventral and dorsal sides;  $r-m$  and  $bM$  without macrotrichia;  $R_1$  0.7 times as long as  $R$ ; c/w ratio 0.74–0.80;  $r-m$  0.7–0.8 as long as  $bM$ . Haltere brownish; head of haltere as long as shaft. **Legs** brownish, slightly paler than thorax. Tibial organ surrounded by a circular border and as wide as half width of tibial apex; tibial organ arranged in an irregular row. Front tibia without or with one robust bristle among vestiture. Mid tibia with one or two slightly robust bristles. Posterior row of bristles extending two-thirds of apical tibia length. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** pale brown, paler than thorax; with long, dark setae. **Hypopygium** (Fig. 47). Gonocoxites wider than long, inner side of gonocoxites with several medium sized setae, outer side with long setae; ventral, inner side of gonocoxites basally separated. Gonostylus swollen, 2.4–2.5 times longer than wide; apex well differentiated, bent inwards, apical cavity conspicuous without microtrichia; one spine on the gonostylus, located subapically, and one long whip-lash hair. Tegmen of the typical ground plan of the *Psl. jejuna* complex, onion-shaped and roundish; the dorsal folds strikingly developed; parameral apodemes basally strongly sclerotized, apically broad. Area of teeth absent. Ejaculatory apodeme short and dark; base of ejaculatory apodeme pale yellow, v-shaped. Posterior portion of gonocoxal apodeme of medium size and brown, medially joined. Anterior portion of gonocoxal apodeme medium long and dark brown.

*Body size:* 2.6–2.9 mm.

*Female.* Unknown.

**Genetic distances.** All three available COI sequences are identical and do not show any pairwise distance. The nearest neighbour is *Psl. tewaipounamu*, diverging by a minimum of 5.84%. Both available 28S sequences are identical. The nearest neighbour is *Psl. tewaipounamu*, diverging by a minimum of 0.17%.

**Etymology.** This new species is named after Peter A. Maddison to acknowledge his valuable collection work.

**Distribution.** New Zealand.

**Discussion.** Among all species of the *Psl. jejuna* complex *Psl. maddisoni* and *Psl. whakahara* have the broadest gonostyli. However due to the hunchbacked shape of the gonostylus *Psl. maddisoni* is easy to identify.

### ***Pseudolycoriella tewaipounamu* sp. n.**

(Figs 20–24, 43)

urn:lsid:zoobank.org:act:NomenclaturalActs/CC9D30E2-C277-42B6-9BB0-257662D26B46

**Material studied.** *Holotype male*. New Zealand: South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, Deer Flat, *Nothofagus* forest, Malaise trap, 01–20.12.2002, leg. M. & C. Jaschhof & U. Kallweit (NZAC, SDEI-Dipt-0000956). *Paratypes*: 6♂♂, same date and same locality as holotype (2x NZAC, SDEI-Dipt-0000952; 4x SDEI, SDEI-Dipt-0000964). 4♂♂ same locality as holotype, Malaise trap, 04–24.01.2002, leg. M. & C. Jaschhof (2x NZAC; 2x SDEI). 4♂♂ South Island, Buller, 5 km W Maruia Springs, mixed *Nothofagus* forest, Malaise trap, 26.11–25.12.2001, leg. M. & C. Jaschhof (2x NZAC, SDEI-Dipt-0000988; 2x SDEI, SDEI-Dipt-0000942 & SDEI-Dipt-0000973). 35♂♂, South Island, Buller, Ahaura, Granville State Forest, altitude 170–250 m, *Nothofagus truncata* forest, Malaise trap, 01.12.1994, leg. D. Hutcheson (17x NZAC, 18x SDEI). 7♂♂ South Island, Buller, Maruia Forest, Shenandoah Saddle, altitude 500 m, *Nothofagus* forest, Malaise trap, 09.10–03.11.2001, leg. M. & C. Jaschhof (3x NZAC, SDEI-Dipt-0000788, SDEI-Dipt-0000960 & SDEI-Dipt-0001179; 4x SDEI, SDEI-Dipt-0000752, SDEI-Dipt-0000787, SDEI-Dipt-0001180 & SDEI-Dipt-0001181). 3♂♂ same locality as previous, Malaise trap, 03–25.11.2001, leg. M. & C. Jaschhof (1x NZAC, SDEI-Dipt-0001045; 2x SDEI, SDEI-Dipt-0001038 & SDEI-Dipt-0001044). 1♂ same locality as previous, sweep net, 25.12.2001, leg. M. Jaschhof (SDEI). 2♂♂ South Island, Buller, Paparoa NP, 5 km E Punakaiki, Inland Pack Track, mixed podocarp/*Nothofagus* forest, Malaise trap, 30.09–05.11.2001, leg. M. & C. Jaschhof (NZAC; SDEI). 4♂♂ South Island, Buller, Rahu Scenic Reserve, 12 km NW Springs Junction, altitude 550 m, mixed *Nothofagus*/podocarp forest, Malaise trap, 27.11–25.12.2001, leg. M. & C. Jaschhof (2x NZAC, SDEI-Dipt-0001481 & SDEI-Dipt-0001490; 2x SDEI, SDEI-Dipt-0001492 & SDEI-Dipt-0001493). 1♂ South Island, Westland, Waiatoto, Kahikatea swamp forest, Malaise trap, 16.10–20.11.2001, M. & C. Jaschhof (SDEI). 1♂ South Island, Westland, Westland NP, SE Gillespies Beach, mixed podocarp forest, Malaise trap, 14.10–21.11.2001, leg. M. & C. Jaschhof (SDEI, SDEI-Dipt-0001028). 3♂♂ South Island, Queenstown Lakes, Otago Lakes, Mt Aspiring NP, Makarora River Valley near Cameron Creek Track, mixed *Nothofagus*/broadleaf forest, sweep net, 18–19.12.2002, leg. M. Jaschhof (1x NZAC, SDEI-Dipt-0000513; 2x SDEI, SDEI-Dipt-0001506). 2♂♂ South Island, Southland, Fiordland, Fiordland NP, Lake Gunn, *Nothofagus* forest, sweep net, 08.01.2002, leg. M. Jaschhof (NZAC; SDEI). 1♂ same locality as previous, Malaise trap, 01–21.12.2002, leg. M. & C. Jaschhof & U. Kallweit (SDEI). 2♂♂ South Island, Southland, Fiordland, Fiordland NP, 3 km E Milford Sound, mixed podocarp/broadleaf forest, Malaise trap, 01–21.12.2002, leg. M. & C. Jaschhof & U. Kallweit (NZAC; SDEI). 1♂ same locality as previous, sweep net, 21.12.2002, leg. M. Jaschhof (SDEI). 8♂♂ South Island, Southland, Fiordland, Fiordland NP, Hollyford River Valley, Moraine Creek Track, mixed podocarp/*Nothofagus* forest, Malaise trap, 05–24.01.2002, leg. M. & C. Jaschhof (4x NZAC, SDEI-Dipt-0000910, SDEI-Dipt-0000927, SDEI-Dipt-0000928 & SDEI-Dipt-0000934; 4x SDEI, SDEI-Dipt-0000879, SDEI-Dipt-0000881, SDEI-Dipt-0000907 & SDEI-Dipt-0000924). 7♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Hollyford River Valley S Divide Creek, mixed *Nothofagus*/broadleaf forest, Malaise trap, 06–24.01.2002, leg. M. & C. Jaschhof (3x NZAC; 4x SDEI, SDEI-Dipt-0000994). 1♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, opposite Earl Mountain Tracks, *Nothofagus* forest, Malaise trap, 05–24.01.2002, leg. M. & C. Jaschhof (SDEI, SDEI-Dipt-0000871). 3♂♂ same locality as previous, Malaise trap, 01–21.12.2002, M. & C. Jaschhof & U. Kallweit (1x NZAC; 2x SDEI). 7♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, 2 km N entrance Earl Mountain Tracks, *Nothofagus* forest, Malaise trap, 01–21.12.2002, leg. M. & C. Jaschhof & U. Kallweit (3x NZAC, SDEI-Dipt-0001169 & SDEI-Dipt-0001173; 4x SDEI, SDEI-Dipt-0001165, SDEI-Dipt-0001172 & SDEI-Dipt-0001174). 2♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, 2 km N entrance Gladehouse Track, *Nothofagus* forest, Malaise trap 01–20.12.2002, leg. M. & C. Jaschhof & U. Kallweit (NZAC, SDEI-Dipt-0001206; SDEI, SDEI-Dipt-0001143). 7♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, opposite Gladehouse Track, *Nothofagus* forest, Malaise trap, 01–21.12.2002, leg. M. & C. Jaschhof & U. Kallweit (4x NZAC, SDEI-Dipt-0001006, SDEI-Dipt-0001014 & SDEI-Dipt-0001016; 3x SDEI, SDEI-Dipt-0001012, SDEI-Dipt-0001017 & SDEI-Dipt-0001025). 5♂♂ same locality as previous, sweep net, 03–04.12.2002, leg. M. Jaschhof (2x NZAC; 3x SDEI). 1♂ South Island, Clutha, Catlins, Purakaunui Scenic Reserve, mixed podocarp/broadleaf/*Nothofagus* forest, sweep net, 03.01.2002, leg. M. Jaschhof (SDEI, SDEI-Dipt-0001484). 3♂♂ same locality as previous, Malaise trap, 27.01–05.03.2002, leg. M. & C. Jaschhof (1x NZAC, SDEI-Dipt-0001139; 2x SDEI, SDEI-Dipt-0001132 & SDEI-Dipt-0001156). 4♂♂ South Island, Clutha, Catlins Coastal Rain Forest Park, Catlins River Valley, silver beech forest, Malaise trap, 27.01–05.03.2002, leg. M. & C. Jaschhof (2x NZAC, SDEI-Dipt-0000614 & SDEI-Dipt-0000801; 2x SDEI, SDEI-Dipt-0000804 & SDEI-Dipt-0000814). **Additional material:** 1♂, SEM-object, same date and same locality as holotype (SDEI, SDEI-Dipt-0000968).

**Description. Male. Head.** Head capsule brown. Eye bridge two to three facets wide. Scape and pedicel mostly

slightly paler brown than the flagellum, or as brown as flagellum; fourth flagellomere 2.5–3.3 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough with deep pits, sensilla of two different lengths, longer sensilla robust and curved; setae on the flagellomere slightly shorter than flagellomere width, slightly curved. Maxillary palp long and pale containing three palpomeres, first one longest, third shortest, first palpomere with four to five long bristles; sensilla on first palpomere long. Prefrons and clypeus bulging. **Thorax**. lateral side yellowish brown, mesonotum and metanotum brownish. Posterior pronotum bare. Anterior pronotum with two to four setae. Episternum 1 with four to seven setae. Mesonotum with five to seven robust lateral bristles. Scutellum with three to four robust bristles and several smaller setae. Katepisternum as long as high, distal part slightly darker than proximal part. **Wing**. Length 2.3–2.7 mm; width/length ratio 0.35–0.41. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, stem of M weak; apical half to apical third of  $R_5$  with macrotrichia on both sides; exceptionally in one specimen (SDEI-Dipt-0001156) three macrotrichia on  $M_1$  on left wing and one macrotrichia on the right  $M_1$ ;  $r-m$  and  $bM$  without macrotrichia (exceptionally one macrotrichium on  $r-m$  on one wing of one specimen [SDEI-Dipt-0001490]);  $R_1$  approximately 0.9–1.3 times as long as  $R$ ;  $c/w$  ratio 0.6–0.8;  $r-m$  1.1–1.3 as long as  $bM$ . Haltere brownish; head of haltere as long as shaft. **Legs** pale brown, much brighter than thorax. Tibial organ surrounded by a circular border and as wide as half of the width of the tibial apex; tibial organ consists of approximately ten bristles arranged in an irregular row. Front tibia without or with one robust bristle among the vestiture. Mid tibia with one or two slightly robust bristles. Hind tibia with a posteriodorsal row of robust bristles, comprising 50–66% of apical part of tibia, several longer additional bristles on the ventral side. All tibial spurs equal in length. Claws with five robust teeth. **Abdomen** pale brown, slightly paler than thorax; with long, dark setae. **Hypopygium** (Figs 20–24 & 43). Gonocoxites wider than long, inner side of gonocoxites with short setae, outer side with long setae; ventral, inner side of gonocoxites widely separated basally. Gonostylus 2.2–2.7 times longer than wide; basal part broad, dorsal margin slightly stretched; apical part large, curved inwards with an apical cavity without microtrichia (Fig. 20); subapically one spine and one long whip-lash hair. Tegmen (Fig. 23) with typical structure of the *Psl. jejuna* complex, parameral apodemes strongly sclerotized up to the apex of the tegmen. Area of teeth absent. Ejaculatory apodeme short and dark, with a distinct base; base pale brown and slender. Posterior portion of gonocoxal apodeme medium sized, brown, and medially connected. Anterior portion of gonocoxal apodeme short and dark brown.

*Body size*: 2.7–3.5 mm.

*Female*. Unknown.

**Genetic distances.** The maximum p-distance between all 48 available COI sequences is 2.28%. The nearest neighbour is *Psl. whakahara*, diverging by a minimum of 3.51%. All six available 28S sequences are identical and do not show differences to *Psl. whakahara*.

**Etymology.** *Te Waipounamu* is the Māori name for the South Island of New Zealand. The epithet of the new species refers to the restricted distribution of this species.

**Distribution.** New Zealand.

**Discussion.** *Pseudolycoriella tewaipounamu* is one of the larger species of the *Psl. jejuna* complex. Some specimens reach a body size similar to that of *Psl. whakahara*, but never have a similarly large wing length. Furthermore, *Psl. tewaipounamu* shows a well-developed apical cavity on the gonostylus, without any microtrichia. The tegmen of this species has strongly sclerotized parameral apodemes, which are darkly coloured up to the apex of the tegmen. In nearly all other species only the proximal branches of these parameral apodemes are strongly sclerotized. Only *Psl. whakahara* has dark coloured distal branches like *Psl. tewaipounamu*, but they are always darker in *Psl. tewaipounamu*.

### *Pseudolycoriella whakahara* sp. n.

(Fig. 45)

urn:lsid:zoobank.org:act:NomenclaturalActs/2227602E-6F96-471F-BED4-CAEB57B55893

**Material studied.** *Holotype male*. New Zealand: South Island, Tasman, Kahurangi NP, Takaka River Valley (Cobb Dam Road), altitude 450–800 m, mixed podocarp/broadleaf forest, Malaise trap, 31.08–07.10.2001, leg. M. & C. Jaschhof (NZAC, SDEI-Dipt-0001439). *Paratypes*. 2♂♂ same locality and same date as holotype (all SDEI, SDEI-Dipt-0001386 and a second specimen in poor condition).

**Description. Male.** **Head.** Head capsule brown. Eye bridge two to three facets wide. Scape and pedicel pale

brown, slightly paler than the flagellum. Fourth flagellomere 3.5 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough, with deep pits, sensilla of two different lengths, setae on the flagellomere robust, longer than flagellomere width, slightly curved. Maxillary palp long and pale, consisting of three palpomeres, first one longest, second shortest, first palpomere with four bristles, one of them more robust; sensilla on first palpomere present. Prefrons and clypeus bulging. **Thorax** pale brown. Posterior pronotum bare. Anterior pronotum with three to four setae. Episternum 1 with five to nine setae. Mesonotum with five to six robust lateral bristles. Scutellum with four to six robust bristles and several smaller setae. Katepisternum as long as high. **Wing.** Length 3.1–3.2 mm; width/length ratio 0.32–0.39. Membrane slightly shaded and without macrotrichia, anal area present; all posterior veins distinct, stem of M weak; apical 50% to 60% of  $R_5$  with macrotrichia on both sides;  $R_1$  0.9–1.0 times as long as R; c/w ratio 0.75–0.77; r-m 0.6–0.7 as long as bM. Haltere brownish; head of haltere shorter than shaft. **Legs** pale brown, brighter than thorax. Tibial organ surrounded by a circular border and as wide as half width of tibial apex; bristles of tibial organ arranged in an irregular row. Front tibia without robust bristle among the vestiture; mid tibia with two robust bristles among the vestiture; hind tibia with an inconspicuous posteriodorsal row of longer setae, two to three robust bristles in the middle of this row. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** slightly paler than thorax; with long, dark setae. **Hypopygium** (Fig. 45). Gonocoxites wider than long, inner side of gonocoxites with medium sized setae, outer side with long setae; ventral, inner side of gonocoxites widely separated basally. Gonostylus 2.2–2.5 times longer than wide; broad, slightly tumid in the middle, apical part not strikingly set off; apical cavity conspicuous, whole inner side without microtrichia; subapically one spine and one long whip-lash hair. Tegmen of the typical ground plan of the *Psl. jejuna* complex; the dorsal folds strikingly developed; parameral apodemes strongly sclerotized basally, moderately sclerotized apically. Area of teeth absent. Ejaculatory apodeme short and strongly sclerotized, base of ejaculatory apodeme delicate, broad, longer than remaining ejaculatory apodeme. Posterior portion of gonocoxal apodeme of medium size and brown, joined medially. Anterior portion of gonocoxal apodeme of medium length and dark brown.

*Body size:* 3.4–3.8 mm.

*Female.* Unknown.

**Genetic distances.** Only one specimen was successfully sequenced. The nearest neighbour is *Psl. tewaipounamu*, diverging by a minimum of 3.51%. For the 28S sequence the nearest neighbours are *Psl. sudhausi* and *Psl. tewaipounamu*.

**Etymology.** *Whakahara* is the Māori modifier for large or giant. It was chosen as the epithet to reflect the large size of the new species.

**Distribution.** New Zealand.

**Discussion.** With a body size of more than 3.4 mm, *Psl. whakahara* is the largest species of the *Psl. jejuna* complex and thus nearly unmistakable. There is a small overlap with larger specimens of *Psl. tewaipounamu*. Nevertheless, such specimens can be separated by comparing wing lengths. The wing of *Psl. tewaipounamu* never reaches in the length of the wing of *Psl. whakahara* (2.3–2.7 mm vs. 3.1–3.2 mm, respectively). Some specimens of *Psl. dagae* also has a wing length which reaches the lower span of *Psl. whakahara*, but the former species can be separated by the more slender and concave gonostylus.

### *Pseudolycoriella sudhausi* sp. n.

(Fig. 37

urn:lsid:zoobank.org:act:NomenclaturalActs/427BBF3C-2DDD-44CA-B7BF-76C0B15212BA)

**Material studied.** *Holotype male.* New Zealand: Stewart Island, Southland, Kaipipi Bay 3 km W Halfmoon Bay, mixed broadleaf/podocarp forest, sweep net, 07.03.2002, leg. M. Jaschhof (NZAC, SDEI-Dipt-0001090). *Paratypes.* 1♂ same locality and same date as holotype (SDEI, SDEI-Dipt-0001093). 2♂♂ South Island, Westland, Waiatoto; Kahikatea swamp forest, Malaise trap, 16.10–20.11.2001, leg. M. & C. Jaschhof (all SDEI). 2♂♂ South Island, Westland, Westland NP, Lake Matheson, mixed podocarp forest, exhauster, 22.10.2001, leg. M. Jaschhof (NZAC; SDEI). 2♂♂ South Island, Westland, Westland NP, SE Gillespies Beach, mixed podocarp forest, exhauster, 19.10.2001, leg. M. Jaschhof (NZAC; SDEI). 3♂♂ South Island, Southland, Fiordland, Fiordland NP, Hollyford River Valley, Moraine Creek Track, mixed podocarp/*Nothofagus* forest, Malaise trap, 05–24.01.2002, leg. M. & C. Jaschhof (2x NZAC, SDEI-Dipt-0000885 & SDEI-Dipt-0000922; 1x SDEI, SDEI-Dipt-0000929). 6♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, 2 km N entrance Earl Mountain Tracks,

*Nothofagus* forest, Malaise trap, 01–21.12.2002, leg. M. & C. Jaschhof & U. Kallweit (3x NZAC, SDEI-Dipt-0001167 & SDEI-Dipt-0001175; 3x SDEI, SDEI-Dipt-0001170 & SDEI-Dipt-0001459). 6♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, 2 km N entrance Gladehouse Track, *Nothofagus* forest, Malaise trap, 01–20.12.2002, leg. M. & C. Jaschhof & U. Kallweit (2x NZAC, SDEI-Dipt-0001147 & SDEI-Dipt-0001148; 4x SDEI, SDEI-Dipt-0001146, SDEI-Dipt-0001149 & SDEI-Dipt-0001177). 2♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, opposite Gladehouse Track, *Nothofagus* forest, sweep net, 03–04.12.2002, leg. M. Jaschhof (NZAC; SDEI). 4♂♂ same locality as previous, Malaise trap, 01–21.12.2002, leg. M. & C. Jaschhof & U. Kallweit (3x NZAC, SDEI-Dipt-0001009, SDEI-Dipt-0001013 & SDEI-Dipt-0001015; 1x SDEI, SDEI-Dipt-0001011). 1♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, Deer Flat, *Nothofagus* forest, Malaise trap, 04–24.01.2002, leg. M. & J. Jaschhof (SDEI). 1♂ same locality as previous, Malaise trap, 01–20.12.2002, leg. M. & C. Jaschhof & U. Kallweit (NZAC). 1♂ Stewart Island, Southland, Rakiura Track between Kaipipi Bay and Sawdust Bay, mixed podocarp/broadleaf forest, sweep net, 07.03.2002, leg. M. Jaschhof (NZAC). 6♂♂ Stewart Island, Southland, Rakiura Track between Sawdust Bay and North Arm Hut, mixed podocarp/broadleaf forest, sweep net, 08.03.2002, leg. M. Jaschhof (2x NZAC; 4x SDEI, SDEI-Dipt-0001071 & SDEI-Dipt-0001116). 5♂♂ Stewart Island, Southland, Freshwater Landing Hut, mixed podocarp/manuka/broadleaf forest, sweep net, 12.03.2002, leg. M. Jaschhof (3x NZAC; 2x SDEI). *Additional material.* 1♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, opposite Earl Mountain Tracks, *Nothofagus* forest, Malaise trap, 01.12–21.12.2002, leg. M. & C. Jaschhof & U. Kallweit (SDEI; specimen in poor condition).

**Description. Male.** Head capsule brown. Eye bridge two to three facets wide. Scape and pedicel slightly paler brown than the flagellum; fourth flagellomere 2.9–3.5 times longer than wide; necks of flagellomeres well differentiated, length of necks increase towards the antennal apex; surface of flagellomeres rough with deep pits, sensilla of two different lengths, small ones and longer, curved sensilla; setae on the flagellomere longer than the flagellomere width, slightly curved. Maxillary palp long and three-segmented, first palpomere is the longest one, second one shortest; first palpomere with long sensilla and two to four long bristles, one bristle longer and more robust, located on the outer side of the first palpomere. Prefrons and clypeus bulging. **Thorax** pale brown, mesonotum slightly darker. Posterior pronotum bare. Anterior pronotum with four to five setae. Episternum 1 with three to seven setae. Mesonotum with four to five robust lateral bristles. Scutellum with three to four robust bristles and several minor setae. Dorsocentral bristles forming a complete row on the mesonotum, anterior ones smaller. Katepisternum as long as high. **Wing.** Length 2.2–2.8 mm; width/length ratio 0.37–0.41. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, except faint stem of M, apical 33–50% of  $R_s$  with macrotrichia on ventral and dorsal side; bM and r-m bare (except one paratype [SDEI-Dipt-0000922] with one macrotricha on r-m on one wing);  $R_1$  0.6–0.9 times as long as R; c/w ratio 0.76–0.81; r-m 0.9–1.3 as long as bM. Haltere brownish; shaft of haltere longer than head. **Legs** pale brown, slightly paler than thorax, occasionally mid and hind coxae concolourous with thorax. Tibial organ surrounded by a circular border and slightly wider than half of the width of the tibial apex; tibial organ consists of an irregular row of bristles. Front tibia without robust bristles among the vestiture (occasionally one bristle). Mid tibia with one slightly robust bristle among vestiture, or bristle missing. Posterior row of bristles inconspicuous, one to four weak bristles. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** concolourous with thorax, with long, dark setae. **Hypopygium** (Fig. 37). Gonocoxites wider than long, inner side of gonocoxites with medium sized setae, outer side with long setae; ventral, inner side of gonocoxites basally separated. Gonostylus elongate, 2.6–3.1 times longer than wide, apex globular and slightly curved inwards, inner side slightly tumid, apical cavity small without microtrichia, remaining inner side scattered with microtrichia, one spine and one whip-lash hair present. Tegmen of the typical ground plan of the *Psl. jejuna* complex, onion-shaped but elongated; dorsal folds present; parameral apodemes basally strongly sclerotized, medially connected, distal branches close and nearly parallel. Area of teeth absent. Ejaculatory apodeme pale, narrow and long, proximal end slightly thickened and slightly darkened; base of ejaculatory apodeme delicate, narrow and long. Posterior portion of gonocoxal apodeme medium sized and brown, joined medially. Anterior portion of gonocoxal apodeme long and dark brown, nearly reaching the proximal end of the hypopygium.

*Body size:* 2.3–2.8 mm.

*Female.* Unknown.

**Genetic distances.** The maximum p-distance between all 19 available COI sequences is 1.37%. The nearest neighbour is *Psl. whena*, diverging by a minimum of 5.02%. All five available 28S sequences are identical and do not show differences to sequences of *Psl. porotaka* and *Psl. whena*. One of those sequences is also identical to the

sequence of *Psl. whakahara*. The reason for this is that both sequences are fragmentary and only share a middle part of about 480 bp in the alignment.

**Etymology.** The new species is named after the phylogenetic biologist Prof. Dr Walter Sudhaus.

**Distribution.** New Zealand.

**Discussion.** *Pseudolycoriella sudhausi* and the species *Psl. nahenahe*, *Psl. whena*, and *Psl. porotaka* have in common a much narrower ejaculatory apodeme than the remaining species of the *Psl. jejuna* complex. Of these species, *Psl. sudhausi* and *Psl. whena* have a width/length ratio of the fourth flagellomere greater than 2.8. *Pseudolycoriella sudhausi* can be distinguished from *Psl. whena* by the wing length (2.2–2.8 mm vs. 1.9–2.1 mm, respectively). The body size also differs, but shows a small range of overlap at 2.3 mm. *Pseudolycoriella whena* has a comparatively smaller tegmen, a shorter gonostylus, and a shorter anterior portion of gonocoxal apodeme than *Psl. sudhausi*.

### ***Pseudolycoriella whena* sp. n.**

(Fig. 38)

urn:lsid:zoobank.org:act:73E8E6FC-CF31-4DD9-9751-C8653FAFE299

**Material studied.** *Holotype male.* New Zealand: North Island, Western Bay of Plenty, Katikati, Te Mania catchment, Malaise trap, 19.09–27.10.2016, leg. P.A. Maddison (NZAC, SDEI-Dipt-0001336). *Paratypes.* 6♂♂ South Island, Marlborough, Marlborough Sounds, Okiwi Bay, Moncrieff Scenic Reserve, mixed *Nothofagus*/podocarp forest, sweep net, 24.12.2001, leg. M. Jaschhof (3x NZAC, SDEI-Dipt-0001118; 3x SDEI, SDEI-Dipt-0001100 & SDEI-Dipt-0001127).

**Description. Male.** **Head.** Head capsule brown. Eye bridge two to three, exceptionally four, facets wide, two at margin. Scape and pedicel mostly paler, contrasting with the brown flagellum. Fourth flagellomere 2.8–3.2 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough with deep pits, sensilla of two different lengths, setae on the flagellomere robust, longer than flagellomere width, slightly curved. Maxillary palp of medium length and pale, consisting of three palpomeres, first one longest, second shortest, first palpomere with two to three bristles, one of them longer and more robust, located on the outer side; sensilla on first palpomere long. Prefrons and clypeus bulging. **Thorax** pale brown, mesonotum slightly darker. Posterior pronotum bare. Anterior pronotum with two to four setae. Episternum 1 with four to seven setae. Mesonotum with two to four robust lateral bristles. Scutellum with four robust bristles and several smaller setae. Dorsocentral bristles forming a complete row on the mesonotum, anterior ones smaller. Katepisternum as long as high. **Wings** of the holotype damaged. Length 1.9–2.1 mm; width/length ratio 0.37–0.41. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, except faint stem of M, apical 33–40% of  $R_s$  with macrotrichia on ventral and dorsal side (except two paratypes which each bear only one macrotrichium on the ventral side of  $R_s$ ); bM and r-m without macrotrichia;  $R_1$  0.6–0.7 times as long as R; c/w ratio 0.72–0.78; r-m 1.0–1.5 as long as bM. Haltere brownish; head of haltere shorter than shaft. **Legs** pale brown, slightly brighter than thorax. Tibial organ surrounded by a circular border and as wide as or even smaller than half the width of the tibial apex; tibial organ consists of an irregular row of bristles. Fore tibia without robust bristles among the vestiture (two paratypes with only one bristle on one side). Mid tibia with none to two slightly robust bristles among the vestiture. Posterior dorsal row of bristles inconspicuous, four to nine weak bristles. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** pale brown, as thorax; with long, dark setae. **Hypopygium** (Fig. 38). Gonocoxites wider than long, inner side of gonocoxites with short setae, outer side with long setae; ventral, inner side of gonocoxites widely separated basally. Gonostylus 2.8–3.1 times longer than wide; elongate and curved, apical part slightly curved inwards, inner side slightly tumid, apical cavity small with scattered macrotrichia; subapically one spine and one long whip-lash hair present. Tegmen of the typical ground plan of the *Psl. jejuna* complex, with an acuminate basic shape; the dorsal folds strikingly developed; parameral apodemes basally strongly sclerotized, medially fused. Area of teeth absent, exceptionally two paratypes (SDEI-Dipt-0001100 & SDEI-Dipt-0001127) with small aggregations of five and twelve tiny teeth, respectively. Ejaculatory apodeme long and of medium thickness, base of ejaculatory apodeme very delicate, short, and u-shaped. Posterior portion of gonocoxal apodeme medium sized and brown, joined medially. Anterior portion of gonocoxal apodeme long and dark brown.

*Body size:* 1.8–2.3 mm.

*Female.* Unknown.

**Genetic distances.** DNA was successfully isolated from only one specimen. The nearest neighbour is *Psl. sudhausi*, diverging by a minimum of 5.02%. The available 28S sequence is identical to those of *Psl. porotaka* and *Psl. sudhausi*.

**Etymology.** The Māori word for dwarf—*whena*—was chosen as epithet, to highlight the minute body size of the new species.

**Distribution.** New Zealand.

**Discussion.** With a body size of up to 2.3 mm, *Psl. whena* together with *Psl. jejunella*, *Psl. nahenahē*, and *Psl. sudhausi* belongs to the smaller species of this species complex. *Pseudolycoriella whena* can be distinguished from *Psl. jejunella* and *Psl. nahenahē* by the longer fourth flagellomere ( $> 2.8$  vs.  $< 2.5$ ). *Pseudolycoriella jejunella* also differs significantly in the shape of the gonostylus. For the distinction of *Psl. whena* and *Psl. sudhausi* see discussion paragraph for *Psl. sudhausi*.

In two paratypes of *Psl. whena* atavistic remains of the area of the teeth are present (see *Psl. jejuna* complex discussion).

### *Pseudolycoriella porotaka* sp. n.

(Fig. 39)

urn:lsid:zoobank.org:act:NomenclaturalActs/EC053068-0F35-494E-9F41-4A28247CA143

**Material studied.** *Holotype male.* New Zealand: North Island, Bay of Plenty, Katikati, Te Mania catchment, Malaise trap, 19.09–27.10.2016, leg. P.A. Maddison (NZAC, SDEI-Dipt-0001225). *Paratype.* 1♂ North Island, Bay of Plenty, Katikati, 449 Lund Road, Malaise trap, 25.07–08.08.2016, leg. P.A. Maddison (SDEI, SDEI-Dipt-0001250).

**Description. Male.** Head capsule brown. Eye bridge three facets wide. Scape and pedicel much paler than the brown flagellomeres; fourth flagellomere 2.3–2.4 times longer than wide; necks of flagellomeres well differentiated, paler than body of flagellomeres; surface of flagellomeres rough with deep pits, sensilla of two different lengths, small ones and longer, curved sensilla; densely arranged setae on the flagellomere shorter than flagellomere width, slightly curved, arising from small elevations. Maxillary palp very long and three-segmented, first palpomere longest, second one shortest; first palpomere with an inconspicuous patch of sensilla and four long bristles, one of which is longer and more robust, located on the outer side of the first palpomere. Prefrons and clypeus bulging. **Thorax** brown, laterally brighter. Posterior pronotum bare. Anterior pronotum with three to five setae. Episternum 1 with seven to nine setae. Mesonotum with five robust lateral bristles. Scutellum with four robust bristles and several minor setae. Katepisternum slightly longer than high. **Wing.** Length 2.7–2.8 mm; width/length ratio 0.36–0.37. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, except faint stem of M, apical half to three-fifths of R<sub>5</sub> with macrotrichia on both ventral and dorsal sides; bM and r-m bare; R<sub>1</sub> 0.8–0.9 times as long as R; c/w ratio 0.77–0.78; r-m as long as bM. Haltere brownish; head of haltere slightly longer than shaft. **Legs** yellowish pale brown, paler than thorax; coxae pale brown. Tibial organ surrounded by a circular border and as wide as half of the width of the tibial apex; tibial organ consists of an irregular row of bristles. Front tibia without robust bristles among the vestiture. Mid tibia without (holotype) or with two (paratype) robust bristles among the vestiture. Posterior row of bristles inconspicuous, extending along two-thirds of tibia apex. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** concolourous with long, dark setae. **Hypopygium** (Fig. 39). Gonocoxites wider than long, inner side of gonocoxites with small setae, outer side with long setae; ventral, inner side of gonocoxites not fused basally. Gonostylus elongate, slightly tumid in the middle, with a dorsal edge, 2.7–2.9 times longer than wide; apex moderately separated, slightly bent, apical end broad, blunt, on ventral side with a apical cavity without microtrichia, one spine and one whip-lash hair present. Tegmen of the typical ground plan of the *Psl. jejuna* complex, of very rounded shape; dorsal folds present; parameral apodemes basally strongly sclerotized, medially fused, distal branches very parallel and close. Area of teeth absent. Ejaculatory apodeme pale brown, slender, and long; base very delicate, long, and u-shaped. Posterior portion of gonocoxal apodeme medium sized and brown, joined medially. Anterior portion of gonocoxal apodeme short and dark brown.

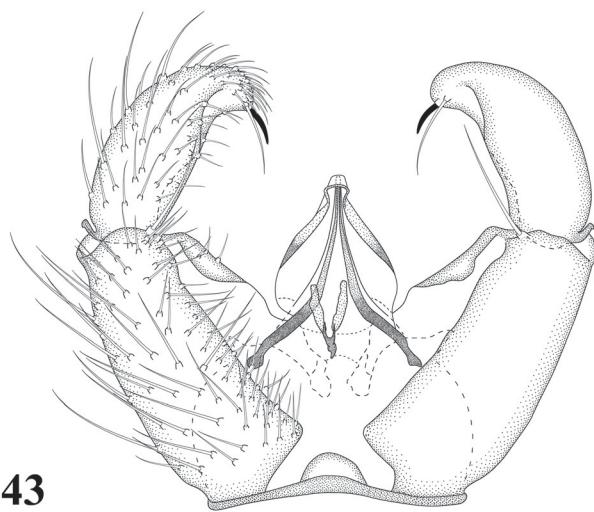
*Body size:* 2.9–3.1 mm.

*Female.* Unknown.

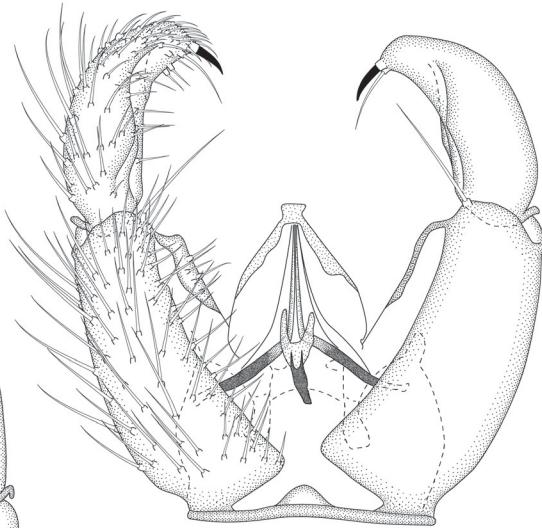
**Genetic distances.** Both available COI sequences show a p-distance of 1.16%. The nearest neighbour is *Psl. whena*, diverging by a minimum of 9.30%. Both available 28S sequences are identical and do not show differences to the sequences of *Psl. sudhausi* and *Psl. whena*.

**Etymology.** *Porotaka* is a Māori word which means round or circular. The epithet refers to the roundish shape of the tegmen.

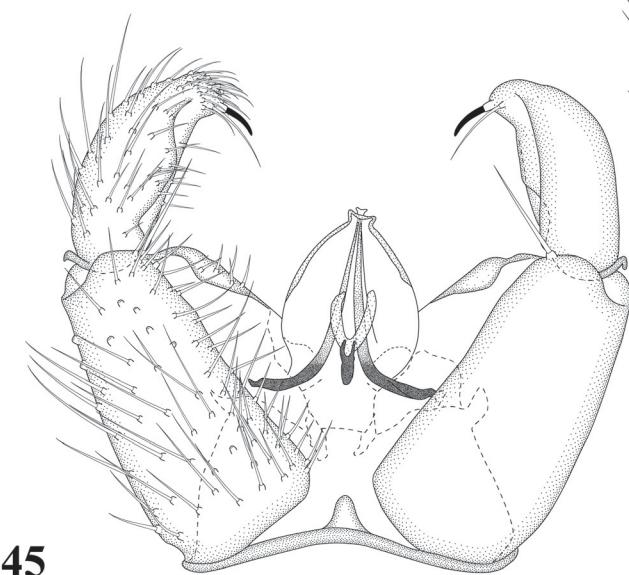
**Distribution.** New Zealand.



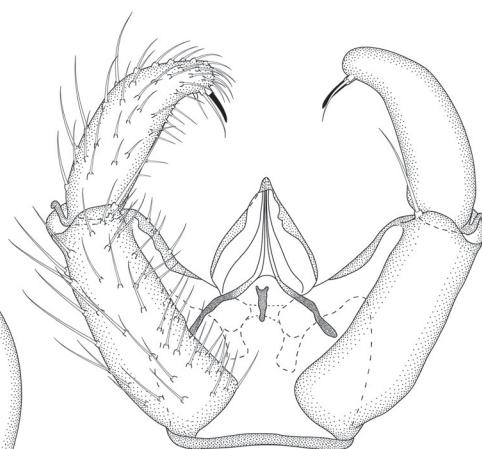
43



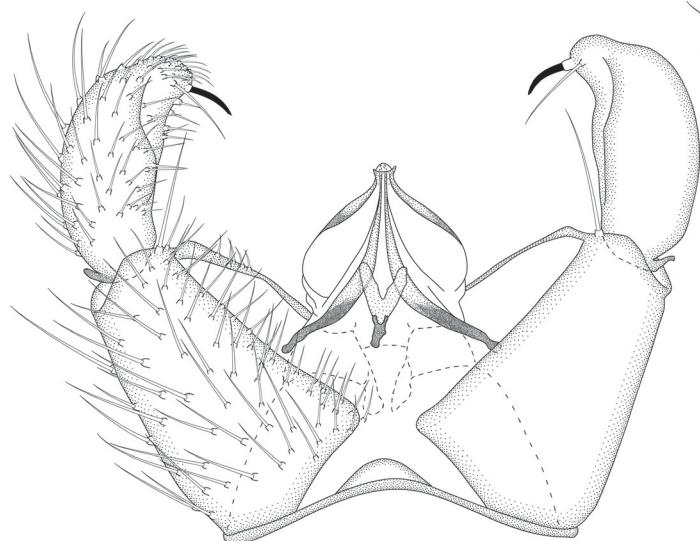
44



45



46



47

43–47  
100  $\mu$ m

**FIGURES 43–47.** *Pseudolycoriella jejuna* complex, hypopygia. **43.** *Pseudolycoriella tewaipounamu* sp. n. **44.** *Pseudolycoriella hauta* sp. n. **45.** *Pseudolycoriella whakahara* sp. n. **46.** *Pseudolycoriella jejunella* sp. n. **47.** *Pseudolycoriella maddisoni* sp. n.

**Discussion.** *Pseudolycoriella porotaka* can be distinguished from all other species of the *Psl. jejuna* complex by the combination of a very rounded tegmen and a low width/length ratio of the fourth flagellomere. In addition, this species has flagellomeres with shorter and denser setae compared to the other species. Like *Psl. nahenahe*, *Psl. sudhausi*, and *Psl. whena*, *Psl. porotaka* has a narrow ejaculatory apodeme.

### *Pseudolycoriella nahenahe* sp. n.

(Fig. 40)

urn:lsid:zoobank.org:act:B0518863-0580-4308-B7E2-61F10B824DB8

**Material studied.** *Holotype male.* New Zealand: Coromandel, Wharekawa Redwood Picnic Area near Opoutere, redwood plantation with pines and tree fern, sweep net, 09.02.2002, leg. M. Jaschhof (NZAC).

**Description. Male.** Head capsule brown. Eye bridge four facets wide, two facets at margin. Scape and pedicel pale, contrasting with the brown flagellum; fourth flagellomere 2.5 times longer than wide; necks of flagellomeres well differentiated; surface of flagellomeres rough with deep pits, sensilla of two different lengths, small ones and longer, curved sensilla; setae as long as a flagellomere's width, slightly curved. Maxillary palp long and three-segmented, first palpomere is the longest, the second shortest; first palpomere with long sensilla and three long bristles. Prefrons and clypeus bulging. **Thorax** brown, with frontal and lateral pale brown patches. Posterior pronotum bare. Anterior pronotum with three setae. Episternum 1 with six setae. Mesonotum with five robust lateral bristles. Scutellum with four robust bristles and several minor setae. Longer and shorter dorsocentral bristles forming a complete row on the mesonotum. Katepisternum as long as high. **Wing.** Length 2.2 mm; width/length ratio 0.37. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, except faint stem of M, apical two-thirds of R<sub>5</sub> with macrotrichia on ventral and dorsal side; bM and r-m bare; R<sub>1</sub> 0.7 times as long as R; c/w ratio 0.71; r-m 1.2 as long as bM. Haltere brownish; shaft of haltere slightly longer than knob. **Legs** pale brown, slightly paler than thorax, mid and hind coxae concolourous with thorax. Tibial organ surrounded by a circular border and slightly wider than half of the width of the tibial apex; tibial organ consists of an irregular row of bristles. Front tibia without robust bristles among the vestiture. Mid tibia with one robust bristle among vestiture. Posterior row of bristles inconspicuous, consisting of three to five bristles. All tibial spurs equal in length. Claws with robust teeth. **Abdomen** concolourous with thorax, with long, dark setae. **Hypopygium.** (Fig. 40) Gonocoxites wider than long, inner side of gonocoxites with medium sized setae, outer side with long setae; ventral, inner side of gonocoxites basally separated. Gonostylus elongated, 2.6 times longer than wide, apex globular and slightly curved inwards, inner side tumid, apical cavity small; one spine and one whip-lash hair present. Tegmen of the typical ground plan of the *Psl. jejuna* complex, onion-shaped but elongated; parameral apodeme basally strongly sclerotized, medially connected. Area of teeth absent. Ejaculatory apodeme pale, narrow and short; base of ejaculatory apodeme not present. Posterior portion of gonocoxal apodeme long and brown, medially joined by a slender bridge. Anterior portion of gonocoxal apodeme long and dark brown.

*Body size:* 2.2 mm.

*Female.* Unknown.

**Genetic distances.** No genetic data available.

**Etymology.** The Māori adjective *nahenahe*—meaning being separate, alone etc.—was chosen as epithet, indicating that only one specimen of this newly described species was available.

**Distribution.** New Zealand.

**Discussion.** Due to the slender ejaculatory apodeme and the tumid gonostylus *Psl. nahenahe* is similar to *Psl. sudhausi*, *Psl. porotaka*, and *Psl. whena*. Among these species *Psl. nahenahe* can be distinguished by a combination of a small body size (2.2 mm) and a low length-width index of the fourth flagellomere. Both *Pseudolycoriella sudhausi* and *Psl. whena* have a fourth flagellomere with a length-width index greater than 2.8, while *Psl. porotaka* has a similar low index of the fourth flagellomere, but has a body size of more than 2.8 mm.

### *Pseudolycoriella macrotegimenta* complex

Thirteen of the species examined during this study have a very similar hypopygia structure. The number of gonostylar spines, ranging from four to ten, is greater than in most other *Pseudolycoriella* species. The length of those spines is also reduced. Consequently, the spines are very difficult to distinguish from the surrounding setae at the

apex of the gonostylus. The apical whip-lash hair is also mostly reduced in length, and in several species two or even three hairs are present. The tegmen possesses a variety of unique characters. Some species bear teeth on the lateral margin of the tegmen (*lt* in Fig. 52). In the most derived state these teeth cover the whole apicolateral part of the tegmen (Fig. 60). On the dorsal side of the tegmen of some species there are creases arising from the outer base and converging towards the apex. These dorsal structures (*ds* in Fig. 52) can vary in length and number. The phylogeny of the *Psl. macrotegmena* complex is shown in Figure 61.

**Discussion.** An assignment of this assemblage of species to one of the existing species groups of *Pseudolycoriella* was not possible, as already mentioned by Köhler & Mohrig (2016) for *Psl. frederickedwardsi* and *Psl. tonnoiri*. With the bulging prefronts and clypeus, and the ground plan of the tibial organ this species complex is undoubtedly part of the genus *Pseudolycoriella*. The increase in the number of gonostylar spines and the reduction of the length and the multiplication of the whip-lash hair can be considered to be morphological evidence for the monophyly of the *Psl. macrotegmena* complex. The result of the molecular analysis also strongly supports the monophyly (Fig. 61). With the numerous gonostylar spines and the reduction of the length of the whip-lash hair the *Psl. macrotegmena* complex resembles the *Psl. quadrispinosa* group from Papua New Guinea (Mohrig 2013). However, in the *Psl. quadrispinosa* group the gonostylar spines are easily distinguishable from the surrounding setae and the whip-lash hair is lost, except in *Psl. bitorquia* Mohrig where a small whip-lash hair persists. In the *Psl. macrotegmena* complex the spines are not as easy to distinguish from the surrounding setae and the whip-lash hair is never completely reduced, only shortened. Further, several species of the *Psl. macrotegmena* complex possess two or three whip-lash hairs. Thus, the gonostylar spines and the whip-lash hair(s) do not necessarily share the same taxonomic value and it is likely that their appearance is a result of convergence. Another similar species is *Psl. curvimedia* Mohrig & Rulik—a species recorded from the Dominican Republic. It also has a similar pattern of spines on the gonostylus. However, there are other characters that differ significantly from those in the *Psl. macrotegmena* complex and therefore do not support integration into the *Psl. macrotegmena* complex. The flagellomeres of *Psl. curvimedia* have a rather smooth surface (Mohrig *et al.* 2004), while those of the species of *Psl. macrotegmena* complex are rough with deep pits. Also, the wing venation of *Psl. curvimedia* is very aberrant in comparison to representatives of the *Psl. macrotegmena* complex. *Pseudolycoriella curvimedia* shows a very short  $R_1$  that only comprises a fourth of  $R$ , a very unusual M-fork, and a nearly rectangularly bent  $CuA_2$ . Furthermore, the gonocoxites of *Psl. curvimedia* are fused ventrally, while they are widely separated in the *Psl. macrotegmena* complex. Another similar species is the Australian *Psl. rubroalata* Mohrig, Kauschke & Broadley, which also bears eight to ten short spines (Mohrig *et al.* 2018), but shows none of the characters on the tegmen that occur in the New Zealand *Psl. macrotegmena* complex. However, without an accurate examination, preferably incorporating genetic analyses, a well-founded conclusion about the relationship of the *Psl. quadrispinosa* group, *Psl. curvimedia*, and *Psl. rubroalata* to the species of the *Psl. macrotegmena* complex is not possible. Until such an examination, it remains unclear whether these species belong to the *Psl. macrotegmena* complex or whether the similar patterns of gonostylar spines are a result of convergence. Nevertheless, it can be stated that surely these species do not belong to the New Zealand crown group of the *Psl. macrotegmena* complex. The combination of an increased number of reduced (i.e. thinner) spines and flagellomeres with a pitted surface can be held to be a synapomorphy for the New Zealand members of this complex. Apart from the morphological considerations noted above, the very small genetic distances between the New Zealand representatives of this complex indicate a more recent radiation of these species.

### *Pseudolycoriella macrotegmena* Mohrig, 1999

(Fig. 48)

**Literature.** *Pseudolycoriella macrotegmena* Mohrig, 1999: Mohrig & Jaschhof (1999): 41–43, Fig. 22 a–f.—Macfarlane *et al.* (2010): 441.

**Material studied.** *Holotype male.* New Zealand: North Island, Stratford, Mount Egmont National Park, East Egmont, altitude 650 m, *Podocarpus* wood with rotten wood and a dense layer of herbs, sweep net, 09.01.1993, leg. M. Jaschhof (PWMP). *New records.* 1♂ North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest, sweep net, 03–04.02.2002, leg. M. Jaschhof (SDEI, SDEI-Dipt-0000859). 2♂♂ same locality as previous, Malaise trap, 26.11–28.12.2002, leg. M. & C. Jaschhof & U. Kallweit (NZAC; SDEI, SDEI-Dipt-0000757).

**Redescription.** *Male.* **Head** brown; eye bridge three facets wide; lateral border of eye bridge two facets wide. Scape and pedicel brown, concolourous with flagellomeres; fourth flagellomere 2.9–3.6 times as long as wide; necks of flagellomeres differentiated; surface of flagellomeres rough with deep pits; sensilla of two different lengths present; setae fine and curved, approximately as long as flagellomere width. Prefrons and clypeus bulging. Maxillary palp three-segmented; first palpomere longest, second palpomere shortest; first palpomere with four bristles and a patch of sensilla. **Thorax** brown, laterally a brighter yellowish-brown. Posterior pronotum bare. Anterior pronotum with five to six bristles. Episternum 1 with seven to eleven bristles. Mesonotum with five to six robust lateral bristles and several longer bristles among the dorsocentrals. Frontal part of mesonotum with a few arcostichal bristles. Scutellum with four robust and some shorter bristles. Katepisternum as long as high. **Wing.** Length 2.4–2.5 mm; width/length ratio 0.36–0.38. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct and without macrotrichia; apical quarter to two-thirds of  $R_s$  with additional macrotrichia ventrally;  $bM$  and  $r\text{-}m$  bare, exceptionally one specimen with one seta on  $r\text{-}m$  on one wing;  $R_1$  short, 0.50–0.67 times as long as  $R$ ;  $M$ -fork longer than stem of  $M$ ; c/w ratio 0.70–0.74;  $r\text{-}m/bM$  ratio 0.8–1.1. Haltere pale brown. **Legs** pale brown; trochanter darker. Fore tibia with none or one to two bristles among the vestiture. Tibial organ comprising more than half of tibial apex, consisting of a patch of bristles surrounded by a robust circular border. Mid tibia with two to four anteroventral and two to three posteroventral robust bristles among the vestiture. Hind tibia with several very robust bristles on anteroventral, posterior and posteroventral sides and a longitudinal row of robust bristles, which comprises two thirds to three quarters of the tibia length. Basal tarsomere of all legs with conspicuous robust bristles. All tibial spurs equal in length. Claws with one robust and three minor teeth. **Abdomen** brown like the thorax or slightly paler, with dark bristles. **Hypopygium** (Fig. 48) brown. Gonocoxites wider than long; basally not fused, without a basal lobe of bristles. Gonostylus slender, slightly curved inwards, 2.7–3.0 times longer than wide; thickest part in the middle, apically with dense setae and a group of approximately six small spines, spines more or less longitudinally directed; subapically with one short whip-lash hair, which is two times as long as the apical spines. Tegmen wider than long and sclerotized, base very strongly sclerotized with short and robust parameral apodeme; lateral margin of tegmen with a sclerotized edge, which bears several small teeth on middle third; apex straight, sclerotisation widely interrupted; dorsal structures absent. Area of teeth consists of more than 20 conspicuous teeth. Ejaculatory apodeme short, broad, and very dark, with a long, broad base. Posterior portion of gonocoxal apodeme broad and brown. Anterior portion of gonocoxal apodeme small, roundish, darker than posterior portion.

*Body size:* 1.8–2.4 mm.

*Female.* Unknown.

**Genetic distances.** Both available COI sequences are identical and do not show any distance. The nearest neighbour is *Psl. wernermohrigi*, diverging by a minimum of 1.84%. The one available 28S sequence is identical to those of *Psl. frederickedwardsi*, *Psl. huttoni*, *Psl. jaschhofi*, *Psl. plicitegmena*, *Psl. robustotegmena*, *Psl. subtilitegmena*, *Psl. tonnoiri*, and *Psl. wernermohrigi*.

**Distribution.** New Zealand.

**Discussion.** *Pseudolycoriella macrotegmena* belongs to those species of the *Psl. macrotegmena* complex which bear lateral teeth on the tegmen. Among these species *Psl. macrotegmena* is the only species that lacks the dorsal structures on the tegmen and has a gonostylus with a subapical lobe on the inner side.

The author of *Psl. macrotegmena* had a wide concept of this species. Accordingly, the paratype series contained two other species: three specimens of *Psl. wernermohrigi* and one specimen of *Psl. frederickedwardsi*. The fifth paratype which is deposited in the NZAC (NZAC02016074) was not studied and remains unrevised. This broad concept of *Psl. macrotegmena* led to an inaccuracy in the original description. Mohrig & Jaschhof (1999) gave a length to width ratio of the fourth flagellomere of 2.4, which is much shorter than the value of 2.9–3.6 revealed by the present study.

### *Pseudolycoriella plicitegmena* sp. n.

(Fig. 49)

urn:lsid:zoobank.org:act:NomenclaturalActs/256F08AF-B9EB-40A7-8D03-E59A5DF412F0

**Material studied.** *Holotype male.* New Zealand: South Island, Clutha, Catlins, Purakaunui Scenic Reserve, mixed podocarp/broadleaf/*Nothofagus* forest, Malaise trap, 27.01–05.03.2002, leg. M. & C. Jaschhof (NZAC, SDEI-Dipt-0001158). *Paratypes.* 4♂♂ same locality and same date as holotype (2x NZAC, SDEI-Dipt-0000560 & SDEI-Dipt-

0001155; 2x SDEI, SDEI-Dipt-0001130 & SDEI-Dipt-0001153). 1♂ South Island, Clutha, Catlins Coastal Rain Forest Park, Catlins River Valley, silver beech forest, Malaise trap, 27.01–05.03.2002, leg. M. & C. Jaschhof (SDEI, SDEI-Dipt-0000799).

**Description.** **Male.** Head brown; eye bridge three facets wide, two at margin. Flagellomeres brown, concolorous with scape and pedicel; fourth flagellomere 2.3–2.9 times as long as wide; necks of flagellomeres differentiated; surface of flagellomeres rough with deep pits; sensilla of two different lengths present; setae sparsely scattered, approximately as long as flagellomere width, bases of setae slightly raised. Prefrons and clypeus moderately bulging. Maxillary palp three-segmented; first palpomere longest, third longer than second; first palpomere with three to four bristles and an inconspicuous patch of sensilla. **Thorax** brown, paler than head; laterally brighter. Posterior pronotum bare. Anterior pronotum with seven to eleven bristles. Episternum 1 with five to nine bristles. Mesonotum with five to six longer bristles among the lateral bristles; row of dorsocentral bristles well developed. Scutellum with two robust and some shorter bristles. Katepisternum bicoloured, basal part pale brown, apically brown; as long as high. **Wing.** Length 2.1–2.3 mm; width/length ratio 0.36–0.40. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, all without macrotrichia; apical fourth of  $R_5$  with additional macrotrichia on ventral side; bM bare; r-m with one macrotrichium or without macrotrichia;  $R_1$  short, 0.46–0.54 times as long as R; M-fork longer than M stem; c/w ratio 0.67–0.74; r-m/bM ratio 1.0–1.3. Haltere pale brown. **Legs** pale brown; coxal bristles dark. Fore tibia with one to four bristles among vestiture; tibial organ comprising half of tibial apex, consisting of a transverse patch of bristles surrounded by a robust circular border. Mid tibia with seven to nine robust bristles among vestiture, located antero- and posteroventrally. Hind tibia with twelve to twenty robust bristles at anteroventral, posterior and posteroventral sides and a longitudinal row of robust bristles, which comprises three-fifths of tibial length. Basal tarsomere of all legs with conspicuous robust bristles. All tibial spurs equal in length. Claws with one robust tooth and several minor teeth. **Abdomen.** Pale brown, with dark bristles. **Hypopygium** (Fig. 49) brown. Gonocoxites wider than long, ventrally u-shaped and not fused, without a basal lobe of bristles. Gonostylus elongate, slightly curved inwards, 3.1–3.4 times longer than wide, inner base with a protruding angle (ba in Fig. 49); apically with dense setae and a group of approximately five to six spines; subapically with two or three medium-sized whip-lash hairs; dorsal side of apex of gonostylus slightly constricted. Tegmen wider than long, base very strongly sclerotized with short, robust parameral apodeme; lateral margin of tegmen with a sclerotized edge, scattered with several small teeth, apically not fused; dorsal structures on tegmen well developed, as long as two-thirds of tegmen length. Area of teeth with 17 to 28 conspicuous teeth. Ejaculatory apodeme short, broad, and very dark, with a broad, u-shaped base. Posterior portion of gonocoaxal apodeme broad and brown. Anterior portion of gonocoaxal apodeme small.

*Body size:* 2.1–2.3 mm.

*Female.* Unknown.

**Genetic distances.** The maximum p-distance between all five available COI sequences is 0.15%. Some COI sequences are identical with *Psl. gonotegmena* and *Psl. subtilitegmena*. Both available 28S sequence are identical and do not show any differences to those of *Psl. frederickewardsi*, *Psl. gonotegmena*, *Psl. huttoni*, *Psl. jaschhofi*, *Psl. macrotegmena*, *Psl. robustotegmena*, *Psl. subtilitegmena*, *Psl. tonnoiri*, and *Psl. wernermohrigi*.

**Etymology.** The epithet of the new species is composed of the two Latin words *plica* (crease) and *tegmen* (cover; technical term for a part of the sciarid hypopygium).

**Distribution.** New Zealand.

**Discussion.** *Pseudolycoriella plicitegmena* belongs to those species of the *Psl. macrotegmena* complex that bear several teeth on the lateral tegmen margin. This sclerotized margin is apically interrupted. This combination can be also found in *Psl. macrotegmena*, *Psl. robustotegmena*, and *Psl. subtilitegmena* and some specimens of *Psl. gonotegmena*. *Pseudolycoriella plicitegmena* can be distinguished from *Psl. macrotegmena* by the different shape of the gonostylus and the presence of the dorsal structure on the tegmen. *Pseudolycoriella gonotegmena* and *Psl. robustotegmena* have a  $R_1/R$  ratio greater than 0.6 while the  $R_1/R$  ratio of *Psl. plicitegmena* is less than 0.6. *Pseudolycoriella robustotegmena* differs significantly because it has a massive tegmen margin, long dorsal structures on the tegmen, and a long ejaculatory apodeme.

***Pseudolycoriella subtilitegmena* sp. n.**

(Fig. 53)

urn:lsid:zoobank.org:act:NomenclaturalActs/7E7F889A-66DB-46DB-8B60-FB995BB62FC9

**Material studied.** *Holotype male.* New Zealand: South Island, Clutha, Catlins, Purakaunui Scenic Reserve, mixed podocarp/broadleaf/*Nothofagus* forest, Malaise trap, 27.01–05.03.2002, leg. M. & C. Jaschhof (NZAC, SDEI-Dipt-0001151). *Paratypes.* 2♂♂ same locality and same date as holotype (NZAC, SDEI-Dipt-0001136; SDEI, SDEI-Dipt-0001133). 1♂ North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest, Malaise trap, 26.11–28.12.2002, leg. M. & C. Jaschhof & U. Kallweit (SDEI).

**Description.** *Male.* Head brown; eye bridge three facets wide, two at margin. Flagellomeres brown, concolourous with scape and pedicel; fourth flagellomere 2.5–2.8 times as long as wide; necks of flagellomeres differentiated; surface of flagellomeres rough with deep pits; sensilla of two different lengths present; setae sparsely scattered, approximately as long as flagellomere width, bases of setae on small elevations. Prefrons and clypeus slightly bulging. Maxillary palp three-segmented; first palpomere longest, third longer than second; first palpomere with two to five bristles and an inconspicuous patch of sensilla; one of the bristles on first and second palpomere robust and elongated. **Thorax** brown, concolourous with head. Posterior pronotum bare. Anterior pronotum with six to nine long bristles. Episternum 1 with five to nine long bristles. Mesonotum with five to six longer bristles among the lateral bristles; row of dorsocentral bristles well developed. Scutellum with two robust and some shorter bristles. Katepisternum slightly longer than high. **Wing.** Length 2.3–2.4 mm; width/length ratio 0.36–0.38. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, all without macrotrichia; apical 25%–40% of  $R_5$  with additional macrotrichia on ventral side; bM bare, r-m with one or two macrotrichia;  $R_1$  short, 0.64–0.71 times as long as  $R$ ; M-fork longer than M stem; c/w ratio 0.67–0.70; r-m/bM ratio 1.0–1.2. Haltere pale brown. **Legs** pale brown, trochanter slightly darker; coxal bristles dark. Fore tibia with one or two bristles among the vestiture; tibial organ comprising half of tibial apex, consisting of a transverse patch of bristles surrounded by a robust circular border. Mid tibia with seven to eight robust bristles among vestiture, located antero- and posteroventrally. Hind tibia with 16 to 22 robust bristles on anteroventral, posterior and posteroventral sides and a longitudinal row of robust bristles, which extends along two-thirds of the length of the tibia. Basal tarsomere of all legs with conspicuous robust bristles. All tibial spurs equal in length. Claws with one robust tooth and several minor teeth. **Abdomen.** Brown, with dark bristles. **Hypopygium** (Fig. 53) brown. Gonocoxites wider than long, ventrally v-shaped and not fused, without a basal lobe of bristles. Gonostylus elongated, apex slightly angled and slightly tapered; without an angle at the base of the gonostylus, 2.7–3.2 times longer than wide; apically with dense setae and a group of approximately five to seven spines; subapically with two to three medium-sized whip-lash hairs. Tegmen wider than long, base very strongly sclerotized with medium-sized, robust parameral apodeme; lateral margin of tegmen with a fine sclerotized edge, which is separated into four fragments: one lateral fragment with a few lateral teeth and one apicolateral fragment (the paratype from the North Island shows fused fragments of each tegmen side); dorsal structures on tegmen developed, as long as half of the length of the tegmen. Area of teeth absent. Ejaculatory apodeme short, broad, and dark, with a broad and extended v-shaped base. Posterior portion of gonocoxal apodeme broad and brown. Anterior portion of gonocoxal apodeme broad.

*Body size:* 2.2–2.6 mm.

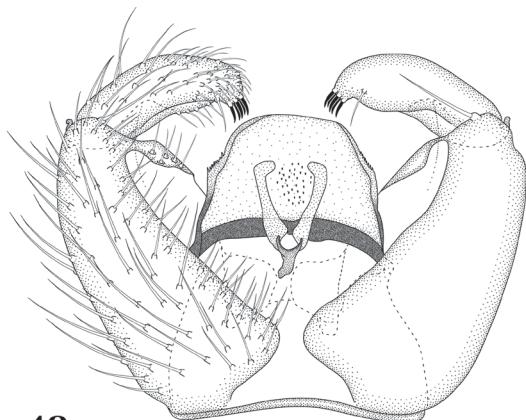
*Female.* Unknown.

**Genetic distances.** All three available COI sequences are identical and do not show any pairwise distance. These COI sequences are identical with that of *Psl. gonotegmena*. One available 28S sequence is identical to those of *Psl. frederickedwardsi*, *Psl. gonotegmena*, *Psl. huttoni*, *Psl. jaschhofi*, *Psl. macrotegmena*, *Psl. plicitegmena*, *Psl. robustotegmena*, *Psl. tonnoiri*, and *Psl. wernermohrigi*.

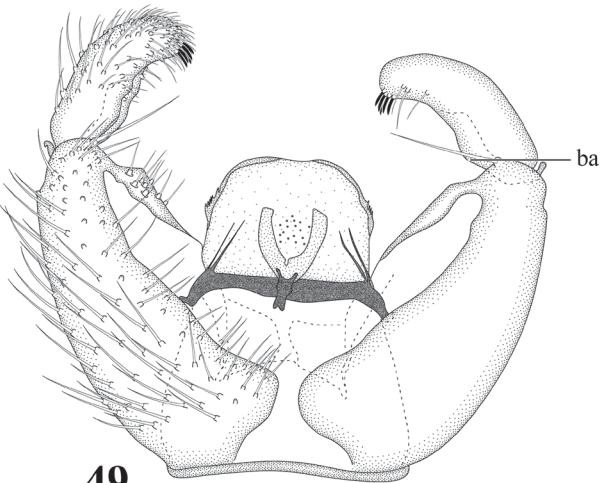
**Etymology.** The epithet of the new species is composed of the two Latin words *subtilis* (fine, delicate) and *tegmen* (cover; technical term for a part of the sciariid hypopygium).

**Distribution.** New Zealand.

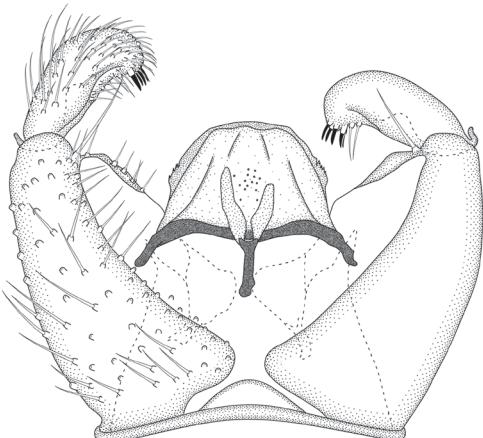
**Discussion.** *Pseudolycoriella subtilitegmena* is the only species among the species of the *Psl. macrotegmena* complex with lateral teeth and a very thin sclerotized margin on the tegmen. Furthermore, the area of teeth is absent, which is also only found in *Psl. tonnoiri* and *Psl. breviseta*. *Pseudolycoriella subtilitegmena* is the only species in this group with a tapered gonostylus apex.



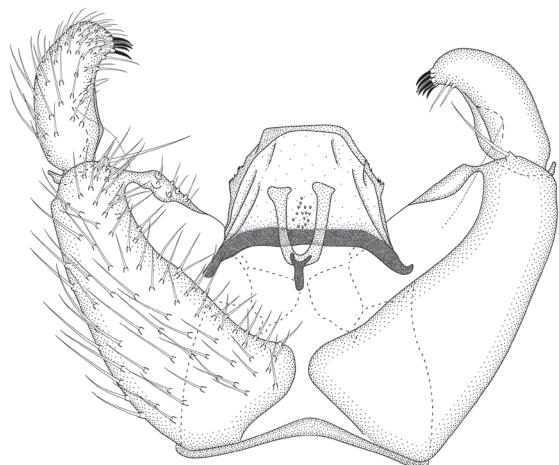
48



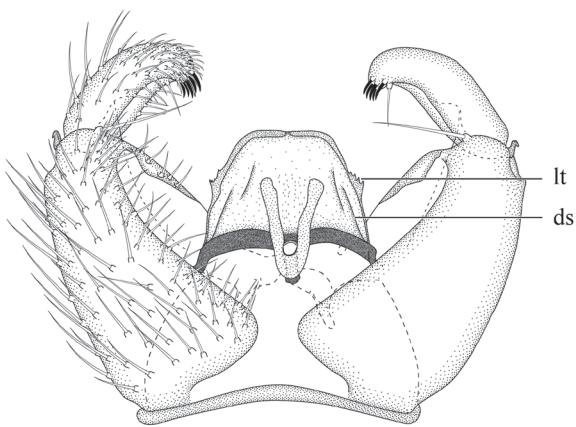
49



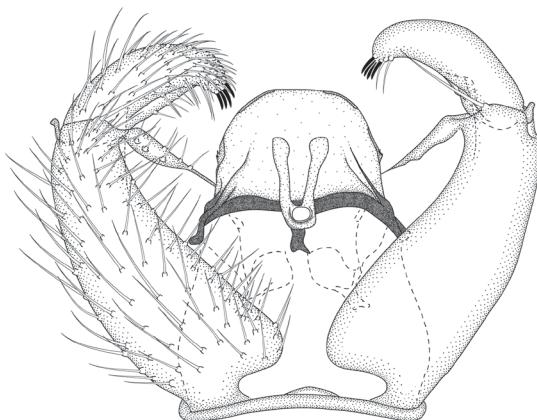
50



51



52



53

48–53  
100 µm

**FIGURES 48–53.** *Pseudolycoriella macrotegmena* complex, hypopygia. **48.** *Pseudolycoriella macrotegmena* Mohrig **49.** *Pseudolycoriella plicitegmena* sp. n. **50.** *Pseudolycoriella wernermohrigi* sp. n. **51.** *Pseudolycoriella huttoni* sp. n. **52.** *Pseudolycoriella gonotegmena* sp. n. **53.** *Pseudolycoriella subtilitegmena* sp. n. Abbreviations: ba = basal angle; ds = dorsal structure on the tegmen; lt = teeth on lateral side of the tegmen.

***Pseudolycoriella gonotegmenta* sp. n.**

(Fig. 52)

urn:lsid:zoobank.org:act:9BD9CFA2-AA84-4340-BA03-C94C77EC9748

**Material studied.** *Holotype male.* New Zealand: South Island, Buller, Rahu Scenic Reserve, 12 km NW Springs Junction, altitude 550 m, mixed *Nothofagus*/podocarp forest, Malaise trap, 27.11–25.12.2001, leg. M. & C. Jaschhof (NZAC, SDEI-Dipt-0001495). *Paratypes.* 2♂♂ North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest, Malaise trap, 26.11–28.12.2002, leg. M. & C. Jaschhof & U. Kallweit (all SDEI). 2♂♂ North Island, Masterton, Tararua Forest Park, Blue Range Hut Track 10 km SW Mt. Bruce, mixed *Nothofagus*/podocarp/broadleaf forest, sweep net, 02.02.2002, leg. M. Jaschhof (NZAC; SDEI). 1♂ South Island, Buller, Ahaura, Granville State Forest, altitude 170–250 m, *Nothofagus truncata* forest, Malaise trap, 01.12.1994, leg. J. Hutcheson (NZAC). 2♂♂ South Island, Buller, 5 km W Maruia Springs, mixed *Nothofagus* forest, Malaise trap, 26.11–25.12.2001, leg. M. & C. Jaschhof (NZAC, SDEI-Dipt-0000977 & SDEI, SDEI-Dipt-0000984). 1♂ South Island, Buller, Lake Daniells Track 7 km E Springs Junction, mixed red/silver beech forest, Malaise trap, 24.11–26.12.2001, leg. M. & C. Jaschhof (SDEI).

**Description.** *Male.* **Head** brown; eye bridge three facets wide, two at margin. Flagellomeres brown, concolorous with scape and pedicel; fourth flagellomere 2.6–2.9 times as long as wide; necks of flagellomeres differentiated; surface of flagellomeres rough with deep pits; sensilla of two different lengths present; setae sparse, approximately as long as flagellomere width, bases of setae with slightly raised coronas. Prefrons and clypeus moderately bulging. Maxillary palp three-segmented; first palpomere longest, third longer than second; first palpomere with two to six bristles and an inconspicuous patch of sensilla; usually one of the bristles on first and second palpomere elongated. **Thorax** brown, laterally extensively brightened. Posterior pronotum bare. Anterior pronotum with five to seven long bristles. Episternum 1 with six to eleven long bristles. Mesonotum with five to six longer bristles among the lateral bristles; row of dorsocentral bristles well developed. Scutellum with two to four robust and some shorter bristles. Katepisternum as long as high. **Wing.** Length 2.0–2.3 mm; width/length ratio 0.35–0.41. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, all without macrotrichia; apical 25%–40% of  $R_5$  with additional macrotrichia on ventral side; bM and r-m bare;  $R_1$  short, 0.64–0.77 times as long as R; M-fork longer than stem of M or—in one case—as long as stem of M; c/w ratio 0.66–0.71; r-m/bM ratio 0.7–1.2. Haltere pale brown. **Legs** pale brown; coxal bristles dark. Fore tibia with one to three bristles among vestiture; tibial organ comprising half of tibial apex, consisting of a transverse patch of bristles surrounded by a robust circular border. Mid tibia with four to six robust bristles among vestiture, located antero- and posterioventrally. Hind tibia with seven to 17 robust bristles on anteroventral, posterior and posterioventral sides and a longitudinal row of robust bristles, which extends two-thirds to four-fifths of tibial length. Basal tarsomere of all legs with conspicuous robust bristles. All tibial spurs equal in length. Claws with one robust tooth and several minor teeth. **Abdomen.** Pale brown, with dark bristles. **Hypopygium** (Fig. 52) brown. Gonocoxites wider than long, ventrally u-shaped and not fused, without a basal lobe of bristles. Gonostylus elongate, apically curved inwards, apex slightly tapered, without an angle at the base of the gonostylus, 2.6–3.3 times longer than wide; apically with dense setae and a group of approximately five to six spines; subapically with one to three medium-sized whip-lash hairs. Tegmen wider than long, base very strongly sclerotized with short, robust parameral apodeme; lateral margin of tegmen with a sclerotized edge, scattered with several small teeth, apically mostly fused (two exceptions with membranous gaps at apex); dorsal structures on tegmen well developed, as long as half tegmen length. Area of teeth with seven to 40 conspicuous teeth. Ejaculatory apodeme short, broad, and dark. Posterior portion of gonocoxal apodeme broad and brown. Anterior portion of gonocoxal apodeme broad and short.

*Body size:* 1.7–2.4 mm.

*Female.* Unknown.

**Genetic distances.** The maximum p-distance between all three available COI sequences is 0.20%. Some of these COI sequences are identical with that of *Psl. plicitegmena*. The one available 28S sequence is identical to those of *Psl. frederickedwardsi*, *Psl. huttoni*, *Psl. jaschhofi*, *Psl. macrotegmena*, *Psl. plicitegmena*, *Psl. robustotegmena*, *Psl. subtilitegmena*, *Psl. tonnoiri*, and *Psl. wernerMohrigi*.

**Etymology.** The epithet of the new species is composed of the Greek word  $\gamma\omega\omega\zeta$  (gonos, edge) and the Latin word *tegmen* (cover; technical term for a part of the sciarid hypopygium).

**Distribution.** New Zealand.

**Discussion.** With the margin of the tegmen apically fused, *Psl. gonotegmenta* resembles *Psl. huttoni* and *Psl.*

*wernermohrigi*. *Pseudolycoriella huttoni* differs by having a u-shaped base of the ejaculatory apodeme, a lower  $R_i/R$  ratio (0.56 vs. 0.64–0.77), and a smaller anterior portion of gonocoaxal apodeme. *Pseudolycoriella wernermohrigi* has a much longer ejaculatory apodeme, a longer parameral apodeme, and a longer anterior portion of gonocoaxal apodeme. In specimens where fragmentation of the tegmen margin has occurred, as for example in two paratypes of *Psl. gonotegmena*, the base of the ejaculatory apodeme has to be examined to enable separation from *Psl. plicitegmena*. In *Psl. gonotegmena* this base is long and broadly v-shaped while *Psl. plicitegmena* has a short a u-shaped base. In addition *Psl. plicitegmena* possess a basal angle on the gonostylus, which is lacking in *Psl. gonotegmena*.

### ***Pseudolycoriella robustotegmena* sp. n.**

(Figs 7 & 54)

urn:lsid:zoobank.org:act:NomenclaturalActs/3346FE28-2271-4E55-8DB1-4CA3ED714633

**Material studied.** *Holotype male*. New Zealand: North Island, Bay of Plenty, Katikati, Uretara mangrove area, Malaise trap, 04.09–22.10.2016, leg. P.A. Maddison (NZAC, SDEI-Dipt-0001358). *Paratype*. 1♂, North Island, Bay of Plenty, Katikati, Te Mania catchment, Malaise trap, 19.09–27.10.2016, leg. P.A. Maddison (SDEI, SDEI-Dipt-0001371).

**Description. Male.** **Head** (Fig. 7) brown; eye bridge two to three facets wide. Flagellomeres brown, concolourous with scape and pedicel; fourth flagellomere 2.7–2.9 times as long as wide; necks of flagellomeres differentiated; surface of flagellomeres rough with deep pits; sensilla of two different lengths present; setae sparse, approximately as long as flagellomere width, bases of setae with coronas. Prefrons and clypeus moderately bulging. Maxillary palp three-segmented; first palpomere longest, third longer than second; first palpomere with three to four bristles and an inconspicuous patch of sensilla; first and second palpomere each with one longer bristle. **Thorax** brown, laterally brighter. Posterior pronotum bare. Anterior pronotum with four to seven bristles. Episternum 1 with five to six bristles. Mesonotum with five longer lateral bristles; row of dorsocentral bristles present. Scutellum with two robust and some shorter bristles. Katepisternum brown, basally slightly brightened; as long as high. **Wing**. Length 2.0–2.2 mm; width/length ratio 0.37–0.38. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, all without macrotrichia; apical fourth of  $R_s$  with five to six additional macrotrichia on ventral side; bM bare; r-m with one macrotrichium (exceptionally the left wing of the holotype shows two macrotrichia on r-m);  $R_i$  short, 0.55–0.57 times as long as R; M-fork shorter than M stem; c/w ratio 0.68–0.70; r-m 0.8 times as long as bM. Haltere pale brown. **Legs** pale brown; coxal bristles dark; trochanter darkened. Fore tibia with one robust bristle among the vestiture; tibial organ comprising more than half of the tibial apex, consisting of a patch of bristles surrounded by a robust circular border. Mid tibia with two anteroventral and two posteroventral robust bristles among the vestiture. Hind tibia with several robust bristles on anteroventral, posterior and posteroventral sides and a longitudinal row of robust bristles, which extends along four fifths of the tibial length. Basal tarsomere of all legs with conspicuous robust bristles. All tibial spurs equal in length. Claws with one robust tooth and several minor teeth. **Abdomen**. Pale brown, with long dark bristles. **Hypopygium** (Fig. 54) brown. Gonocoxites wider than long, ventrally not fused, without a basal lobe of bristles. Gonostylus long and evenly curved, 2.8–3.1 times longer than wide; apically with dense setae and a group of approximately four to five spines; subapically with two to three medium-sized whip-lash hairs; inner base of gonostylus with an angle. Tegmen strongly sclerotized, wider than long, base very strongly sclerotized with long parameral apodeme; lateral margin of tegmen with a broad sclerotized edge; laterally scattered with several small teeth; sclerotized edge interrupted apically; dorsal structures well developed, reaching apex of the tegmen. Area of teeth with ten to twenty conspicuous teeth. Ejaculatory apodeme medium-sized, broad, and very dark, with a broad, u-shaped base. Posterior portion of gonocoaxal apodeme broad and brown. Anterior portion of gonocoaxal apodeme broad and short.

*Body size*: 2.2–2.3 mm.

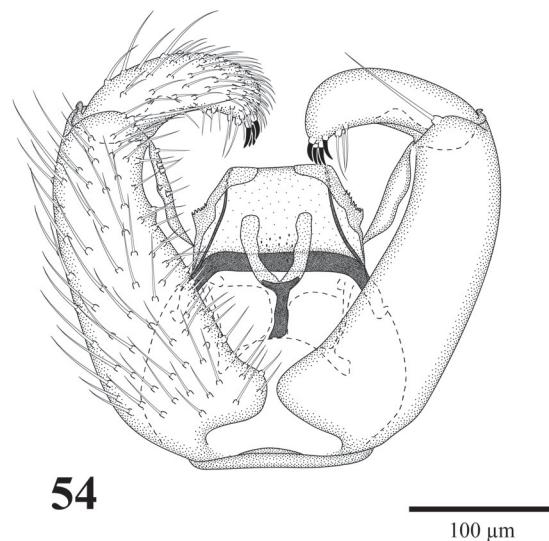
*Female*. Unknown.

**Genetic distances.** Both available COI sequences are identical and do not show any p-distances. The nearest neighbour is *Psl. gonotegmena*, diverging by a minimum of 0.61%. Both available 28S sequence are identical and do not show any differences to those of *Psl. frederickedwardsi*, *Psl. gonotegmena*, *Psl. huttoni*, *Psl. jaschhofi*, *Psl. macrotegmena*, *Psl. plicitegmena*, *Psl. subtilitegmena*, *Psl. tonnoiri*, and *Psl. wernermohrigi*.

**Etymology.** The name of the newly described species is composed of the two Latin words *robustus* (robust) and *tegmen* (cover; technical term for a part of the sciarid hypopygium).

**Distribution.** New Zealand.

**Discussion.** *Pseudolycoriella robustotegmenta* can be distinguished from the remaining species of this complex by the strongly developed margin of the tegmen, robust dorsal structures on the tegmen reaching the apex, and the base of vein M longer than the M-fork.



**FIGURE 54.** *Pseudolycoriella robustotegmenta* sp. n., hypopygium.

***Pseudolycoriella huttoni* sp. n.**

(Fig. 51)

urn:lsid:zoobank.org:act:6434BD19-1F69-47FD-A8FB-5A73560A1082

**Material studied.** *Holotype male.* New Zealand: North Island, Taupo, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, podocarp/broadleaf forest; Malaise trap, 26.11–28.12.2002, leg. M. & C. Jäschhof & U. Kallweit (NZAC, SDEI-Dipt-0000621).

**Description. Male.** Head brown; eye bridge two to three facets wide. Flagellomeres brown, concolourous with scape and pedicel; fourth flagellomere 2.9 times as long as wide; necks of flagellomeres differentiated; surface of flagellomeres rough with deep pits; sensilla of two different lengths present; setae sparse, approximately as long as flagellomere width, bases of setae with slightly raised coronas. Prefrons and clypeus moderately bulging. Maxillary palp three-segmented; first and third palpomere equal in length, longer than second; first palpomere with five bristles and an inconspicuous patch of sensilla; first and second palpomere with one longer outward orientated bristle. Thorax brown, lateral slightly brightened. Posterior pronotum bare. Anterior pronotum with five bristles. Episternum 1 with nine bristles. Mesonotum with five longer lateral bristles; row of dorsocentral bristles present. Scutellum with two robust and some shorter bristles. Katepisternum nearly as long as high. **Wing.** Length 2.3 mm; width/length ratio 0.38. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, except weak stem of M, all without macrotrichia; apical third of  $R_5$  with nine additional macrotrichia on ventral side; bM bare; left r-m bare, right r-m with one macrotrichium;  $R_1$  short, 0.56 times as long as R; M-fork longer than M stem; c/w ratio 0.70; r-m 0.8 times as long as bM. Haltere paler brown than thorax. **Legs** pale brown; coxal bristles dark; trochanter slightly darker. Fore tibia with one robust bristle among vestiture; tibial organ comprising more than half of tibial apex, consisting of a patch of bristles surrounded by a robust circular border. Mid tibia with six robust bristles among the vestiture, located on anteroventral and posteroventral side. Hind tibia with several robust bristles at anteroventral, posterior and posteroventral sides and a longitudinal row of robust bristles, which comprises one half of tibial length. Basal tarsomere of all legs with conspicuous robust bristles. All tibial spurs equal in length. Claws with one robust tooth and several minor teeth. **Abdomen.** Pale brown, with long dark bristles.

**Hypopygium** (Fig. 51) brown. Gonocoxites wider than long, ventrally not fused, without a basal lobe of bristles. Gonostylus long and apically curved, giving it a hump-backed appearance, 2.8 times longer than wide; apically with dense setae and a group of approximately five spines; subapically with three medium-sized whip-lash hairs; inner base of gonostylus without a remarkable angle. Tegmen strongly sclerotized, slightly wider than long, base very strongly sclerotized with long parameral apodemes; lateral margin of tegmen with a sclerotized edge; laterally scattered with several small teeth; sclerotized edge surrounds apex of tegmen; dorsal structures well developed, as long as two-thirds of tegmen. Area of teeth present, comprising fifteen teeth. Ejaculatory apodeme short, broad, and very dark, with a long, u-shaped, pale brown base. Posterior portion of gonocoxal apodeme broad and brown. Anterior portion of gonocoxal apodeme very short.

*Body size:* 2.6 mm.

*Female.* Unknown.

**Genetic distances.** Only one COI sequence was available. The nearest neighbour is *Psl. tonnoiri*, diverging by a minimum of 2.74%. The one available 28S sequence is identical to those of *Psl. frederickedwardsi*, *Psl. jaschhofi*, *Psl. macrotegmena*, *Psl. plicitegmena*, *Psl. robustotegmena*, *Psl. subtilitegmena*, *Psl. tonnoiri*, and *Psl. wernermohrigi*.

**Etymology.** The epithet was selected to honour Frederick Wollaston Hutton (1836–1905), who described the first New Zealand sciarid fly in 1881.

**Distribution.** New Zealand.

**Discussion.** *Pseudolycoriella huttoni* is morphologically very similar to *Psl. wernermohrigi*, but shows a considerable difference in the genetic analysis (Fig. 61). As reliable distinguishing characters the length of the ejaculatory apodeme and the length of the anterior portion of gonocoxal apodeme can be used.

### *Pseudolycoriella wernermohrigi* sp. n.

(Fig. 50)

urn:lsid:zoobank.org:act:NomenclaturalActs/F62E7CA7-79FB-44C4-AC2C-FD9403DDAD27

**Literature.** *Pseudolycoriella macrotegmena* Mohrig, 1999: Mohrig & Jaschhof (1999): 41–43 [misidentification].

**Material studied.** *Holotype male.* New Zealand: North Island, Western Bay of Plenty, Katikati, Te Mania catchment, Malaise trap, 19.09–27.10.2016, leg. P.A. Maddison (NZAC, SDEI-Dipt-0001223). *Paratypes.* 10♂ same locality and same date as holotype (5x NZAC, SDEI-Dipt-0000670, SDEI-Dipt-0000674, SDEI-Dipt-0001227, SDEI-Dipt-0001238 & SDEI-Dipt-0001245; 5x SDEI, SDEI-Dipt-0000665, SDEI-Dipt-0001234, SDEI-Dipt-0001334, SDEI-Dipt-0001235 & SDEI-Dipt-0001373). 1♂ North Island, Auckland, Pukororo Miranda, Te Kama forest remnant, litter, 13.11.2014, leg. P.A. Maddison (NZAC, SDEI-Dipt-0001270). 2♂ North Island, Thames-Coromandel, Coromandel Range, 5 km east of Coromandel, dense *Podocarpus* secondary wood with tree ferns, sweep net, 28.12.1992, leg. M. Jaschhof (PWMP; SDEI [both specimens previously misidentified, published as paratypes of *Psl. macrotegmena* in Mohrig & Jaschhof 1999]). 1♂ North Island, Wairoa, Urewera National Park, Huiarau Range 30 km southeast of Murupara, altitude 600–1,000 m, *Podocarpus-Nothofagus* wood, sweep net, 23.12.1992, leg. M. Jaschhof (PWMP [previously misidentified, published as paratype of *Psl. macrotegmena* in Mohrig & Jaschhof 1999]). 1♂ North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest, malaise trap, 26.11–28.12.2002, leg. M. & C. Jaschhof & U. Kallweit (SDEI). 7♂ North Island, Taupo, Pureora Forest Park, Waipapa Reserve, altitude 600 m, mixed podocarp/broadleaf forest, sweep net, 04–05.02.2002, leg. M. Jaschhof (3x NZAC, SDEI-Dipt-0000824; 4x SDEI, SDEI-Dipt-0000822 & SDEI-Dipt-0000825). *Additional material.* 2♂ same locality and same date as holotype (all SDEI, SDEI-Dipt-0000681 & SDEI-Dipt-0001232).

**Description.** *Male.* Head brown; eye bridge two to three facets wide. Flagellomeres brown, concolourous with scape and pedicel; fourth flagellomere 2.5–2.9 times as long as wide; necks of flagellomeres differentiated; surface of flagellomeres rough with deep pits; sensilla of two different length present; setae sparse, approximately as long as flagellomere width, bases of setae with slightly raised coronas. Prefrons and clypeus bulging. Maxillary palp three-segmented; first palpomere longest, third longer than second; first palpomere with two to six bristles and an inconspicuous patch of sensilla; first and second palpomeres each with one longer outward orientated bristle. **Thorax** brown, laterally brighter. Posterior pronotum bare. Anterior pronotum with four to seven bristles. Episternum 1 with

five to seven bristles. Mesonotum with five to seven longer lateral bristles; row of dorsocentral bristles present. Scutellum with two robust and some shorter bristles. Katepisternum brown; as long as high. **Wing.** Length 2.0–2.3 mm; width/length ratio 0.35–0.42. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, all without macrotrichia; apical quarter of  $R_5$  with two to five additional macrotrichia on ventral side; bM and r-m bare (exceptionally one of the misidentified paratypes from the type series of *Psl. macrotegmena* bears one macrotrichium on r-m on the right wing);  $R_1$  short, 0.51–0.71 times as long as R; M-fork longer than M stem; c/w ratio 0.68–0.74; r-m 0.8–1.1 times as long as bM. Haltere brown. **Legs** pale brown; coxal bristles dark; trochanter darkened. Fore tibia mostly with one to two robust bristles among the vestiture, two exceptions with no bristles among vestiture; tibial organ comprising more than half of tibial apex, consisting of a patch of bristles surrounded by a robust circular border. Mid tibia with five to six robust bristles among vestiture, located on anteroventral and posteroventral side. Hind tibia with several robust bristles on anteroventral, posterior and posteroventral sides and a longitudinal row of robust bristles, which comprises three quarters of tibial length. Basal tarsomere of all legs with conspicuous robust bristles. All tibial spurs equal in length. Claws with one robust tooth and several minor teeth. **Abdomen.** Pale brown, with long dark bristles. **Hypopygium** (Fig. 50) brown. Gonocoxites wider than long, ventrally not fused, without a basal lobe of bristles. Gonostylus long and apically curved, giving it a hump-backed appearance, 2.6–3.2 times longer than wide; apically with dense setae and a group of approximately five to seven spines; subapically with two medium-sized whip-lash hairs; inner base of gonostylus without a noticeable angle. Tegmen strongly sclerotized, slightly wider than long, base very strongly sclerotized with long parameral apodemes; lateral margin of tegmen with a sclerotized edge; laterally scattered with several small teeth; sclerotized edge surrounds apex of tegmen, exceptionally with a small interruption apically; dorsal structures well developed, at least as long as two-thirds of tegmen or reaching apex of the tegmen. Area of teeth mostly impoverished, without teeth or with a few tiny teeth (maximally up to fifteen; one exception with twenty teeth). Ejaculatory apodeme long, broad, and very dark, with a long base. Posterior portion of gonocoxal apodeme broad and brown. Anterior portion of gonocoxal apodeme narrow and long.

*Body size:* 2.0–2.5 mm.

*Female.* Unknown.

**Genetic distances.** The maximum p-distance between all twelve available COI sequences is 1.82% (0.61%, if the specimens SDEI-Dipt-0000681 & SDEI-Dipt-0001232 are omitted). The nearest neighbour is *Psl. macrotegmena*, diverging by a minimum of 1.84%. The maximum p-distance between all twelve available 28S sequences is 0.06%. Some of these sequences are identical to those of *Psl. frederickedwardsi*, *Psl. gonotegmena*, *Psl. huttoni*, *Psl. jaschhofi*, *Psl. macrotegmena*, *Psl. plicitegmena*, *Psl. robustotegmena*, *Psl. subtilitegmena*, and *Psl. tonnoiri*.

**Etymology.** The newly described species is named after Prof. Dr Werner Mohrig (1937–2019), who had fruitfully worked on sciarid taxonomy for over five decades.

**Distribution.** New Zealand.

**Discussion.** Three of the paratypes of *Psl. macrotegmena*, designated by Mohrig & Jaschhof (1999), actually represent *Psl. wernermohrigi*. Both cryptic species share the remarkable lateral teeth on the tegmen margin with five other species (*Psl. dentitegmena*, *Psl. huttoni*, *Psl. plicitegmena*, *Psl. gonotegmena*, and *Psl. subtilitegmena*). However, unlike *Psl. macrotegmena*, the sclerotized margin of the tegmen of *Psl. wernermohrigi* is broad and surrounds the apex without any gap. This character can also be found in *Psl. huttoni*, but compared to this species and the other species with lateral teeth on the tegmen, *Psl. wernermohrigi* has the longest ejaculatory apodeme. Only *Psl. dentitegmena* has an ejaculatory apodeme of a similar length, but has a tegmen with major differences.

Two specimens (SDEI-Dipt-0000681 & SDEI-Dipt-0001232) were identified as *Psl. wernermohrigi* based on morphology. However, their genetic data differ from other conspecific specimens, which were also barcoded. Their highest p-distance for the COI gene with regard to other *Psl. wernermohrigi* specimens is 1.82%, which is a high value in this species complex. Consequently, both specimens are in a sister-group relationship with respect to the remaining *Psl. wernermohrigi* specimens (Fig. 61). Thus, the existence of a further species cannot be completely ruled out. Both specimens were treated as additional material and not included in the type series.

***Pseudolycoriella dentitegmena* sp. n.**

(Fig. 60)

urn:lsid:zoobank.org:act:4C5B54A5-1BA7-478F-9879-5C3DCCEF1815

**Material studied.** *Holotype male.* New Zealand: North Island, Taupo, Pureora Forest, Select Loop Road, Malaise trap, 15.07–23.08.2001, leg. M. & C. Jaschhof (NZAC, SDEI-Dipt-0000594).

**Description.** *Male.* Head brown; eye bridge one to three facets wide. Flagellomeres brown, paler than head, concolourous with scape and pedicel; fourth flagellomere 3.1 times as long as wide; necks of flagellomeres differentiated; surface of flagellomeres rough with deep pits; sensilla of two different lengths present; setae sparse, approximately as long as flagellomere width, bases of setae with slightly raised coronas. Prefrons and clypeus moderately bulging. Maxillary palp three-segmented; first palpomere longest, third slightly longer than second; first palpomere with three bristles and an inconspicuous patch of sensilla. **Thorax** brown, slightly paler than head. Posterior pronotum bare. Anterior pronotum with seven bristles. Episternum 1 with ten bristles. Mesonotum with five longer bristles among the lateral bristles; row of dorsocentral bristles well developed. Scutellum with two robust and some shorter bristles. Katepisternum bicoloured, basal part pale brown, apically brown; as long as high. **Wing.** Length 2.9 mm; width/length ratio 0.38. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct, all without macrotrichia; apical third of  $R_5$  with additional macrotrichia on ventral side; bM bare; r-m with one macrotrichium;  $R_1$  short, 0.71 times as long as R; M-fork longer than M stem; c/w ratio 0.71; r-m and bM equal in length. Haltere pale brown. **Legs** pale brown; coxal bristles dark. Fore tibia without bristles among vestiture; tibial organ comprising half of tibial apex, consisting of a transverse patch of bristles surrounded by a robust circular border. Mid tibia with two robust bristles; one anteroventrally and one posterioventrally among the vestiture. Hind tibia with several robust bristles on anteroventral, posterior and posterioventral sides and a longitudinal row of robust bristles, which extends two-thirds of tibial length. Basal tarsomere of all legs with conspicuous robust bristles. All tibial spurs equal in length. Claws with one robust tooth and several minor teeth. **Abdomen.** Pale brown, with dark bristles. **Hypopygium** (Fig. 60) brown. Gonocoxites wider than long, ventrally v-shaped and not fused, without a basal lobe of bristles. Gonostylus long and slender, curved slightly inwards, 3.9 times longer than wide; apically with dense setae and a group of approximately six spines; subapically with two medium-sized whip-lash hairs. Tegmen longer than wide, base very strongly sclerotized with medium-sized, robust parameral apodeme; lateral margin of tegmen with a sclerotized margin; several small teeth scattered on lateral and subapical margin; apex of tegmen membranous; dorsal structures on tegmen indicated. Area of teeth with 15 conspicuous teeth. Ejaculatory apodeme medium-sized, broad, and very dark, with a broad, horseshoe-shaped base. Posterior portion of gonocoxal apodeme broad and brown. Anterior portion of gonocoxal apodeme not present.

*Body size:* 2.8 mm.

*Female.* Unknown.

**Genetic distances.** No genetic data available.

**Etymology.** The epithet of the new species is composed of the two Latin words *dentis* (teeth) and *tegmen* (cover; technical term for a part of the sciarid hypopygium).

**Distribution.** New Zealand.

**Discussion.** Due to the presence of several small spines and two whip-lash hairs on the gonostylus *Psl. dentitegmena* can easily be recognized as a species of the *Psl. macrotegmena* group. However, it is unique because of the long tegmen with many scattered subapical teeth. Furthermore *Psl. dentitegmena* has the longest body length, wing length, and length-width ratio of the gonostylus in this species complex.

***Pseudolycoriella breviseta* Mohrig, 1999**

(Fig. 59)

**Literature.** *Pseudolycoriella breviseta* Mohrig, 1999: Mohrig & Jaschhof (1999): 41, Fig. 21 a–f.—Macfarlane *et al.* (2010): 441.

**Material studied.** *Holotype male.* New Zealand: North Island, Northland, Waipoua Forest, 45 km northwest of Dargaville, sweep net, 31.12.1992, leg. M. Jaschhof (PWMP). **Paratypes.** 3♂♂ same location and same date as holotype (all PWMP). 2♂♂ North Island, Northland, Puketi Forest, Waipapa River Valley, sweep net, 01–02.01.1993, leg. M. Jaschhof (PWMP & SDEI).

**Description.** See Mohrig & Jaschhof (1999).

**Genetic distances.** No genetic data available.

**Remarks.** Due to the numerous short spines on the gonostylus and the short whip-lash hairs *Psl. breviseta* belongs to the *Psl. macrotegmena* complex. The lateral projections on the tegmen are unique among the species of the genus *Pseudolycoriella*. Unfortunately, no new records could be obtained; consequently, no genetic information for this species is available. According to the New Zealand Arthropod Collection (2019) the sixth paratype of *Psl. breviseta* (NZAC02016075) that was not examined in the present study is labelled with a different sampling locality compared to Mohrig & Jaschhof (1999). Instead of Puketi Forest the sampling locality is given as East Egmont (North Island, Taranaki, Mount Egmont National Park), which would be the southernmost locality of this species.

### *Pseudolycoriella frederickedwardsi* Köhler, 2016

(Fig. 57)

**Literature.** *Pseudolycoriella macrotegmena* Mohrig, 1999: Mohrig & Jaschhof (1999): 41–43 [misidentification].—*Pseudolycoriella frederickedwardsi* Köhler, 2016: Köhler & Mohrig (2016): 101–103, Fig. 5 A-D.

**Material studied.** *Previously published material:* 1♂ New Zealand: North Island, Thames-Coromandel, Coromandel Range, 5 km east of Coromandel, *Podocarpus* wood, 28.12.1992, leg. M. Jaschhof (PWMP [misidentified, wrongly designated as paratype *Psl. macrotegmena* in Mohrig & Jaschhof (1999)])]. *New records.* 7♂♂ North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest [type locality], sweep net, 03–04.02.2002, leg. M. Jaschhof (3x NZAC, SDEI-Dipt-0000945, SDEI-Dipt-0000947 & SDEI-Dipt-0001530; 4x SDEI, SDEI-Dipt-0000772, SDEI-Dipt-0001531 & SDEI-Dipt-0001535). 7♂♂ North Island, same locality as previous, Malaise trap, 26.11–28.12.2002, leg. M. & C. Jaschhof & U. Kallweit (3x NZAC, SDEI-Dipt-0001221, SDEI-Dipt-0001224 & SDEI-Dipt-0001537; 4x SDEI, SDEI-Dipt-0000756, SDEI-Dipt-0001237, SDEI-Dipt-0001241 & SDEI-Dipt-0001247). 5♂♂, North Island, Taupo, Pureora Forest, Select Loop Road, altitude 500 m, mixed mature podocarp forest, Malaise trap, 15.07–23.08.2001, leg. M. & C. Jaschhof (2x NZAC, SDEI-Dipt-0000568 & SDEI-Dipt-0001507; 3x SDEI, SDEI-Dipt-0001508, SDEI-Dipt-0001509 & SDEI-Dipt-0001510). 4♂♂ North Island, Taupo, Pureora Forest Park, Waipapa Reserve, altitude 600 m, mixed podocarp/broadleaf forest, sweep net, 04–05.02.2002, leg. M. Jaschhof (1x NZAC; 3x SDEI, SDEI-Dipt-0000823).

**Description.** See Köhler & Mohrig (2016).

**Genetic distances.** The maximum p-distance between all eleven available COI sequences is 0.46%. The nearest neighbour is *Psl. huttoni*, diverging by a minimum of 2.75%. The maximum p-distance between all twelve available 28S sequences is 0.17%. Some of these sequences are identical to those of *Psl. gonotegmena*, *Psl. huttoni*, *Psl. jaschhofi*, *Psl. macrotegmena*, *Psl. plicitegmena*, *Psl. robustotegmena*, *Psl. subtilitegmena*, *Psl. tonnoiri*, and *Psl. wernermohrigi*.

**Remarks.** Among the paratypes of *Psl. macrotegmena*, designated by Mohrig & Jaschhof (1999), there was one specimen of *Psl. frederickedwardsi* (see *Psl. macrotegmena*). Dorsal structures on the tegmen, which occur in several species of this complex, are absent.

### *Pseudolycoriella tonnoiri* Köhler, 2016

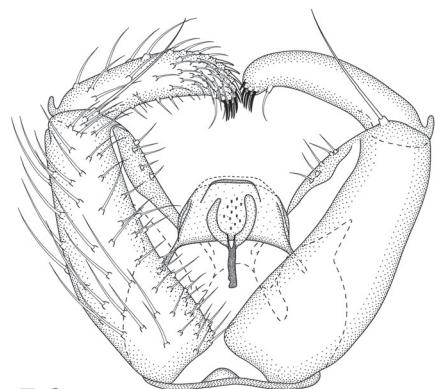
(Fig. 58)

**Literature.** *Pseudolycoriella tonnoiri* Köhler, 2016: Köhler & Mohrig (2016): 104–106, Fig. 6 A–D.

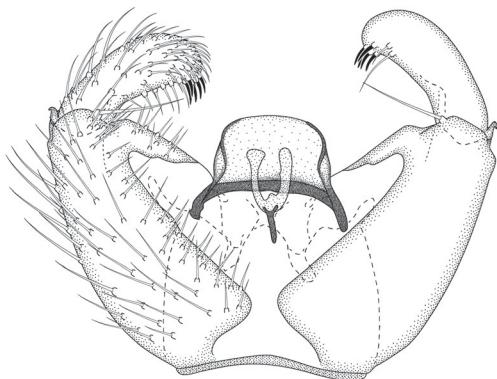
**Material studied.** *New records.* 6♂♂ New Zealand: North Island, Ruapehu, Tongariro NP, Mangawhero River Valley 3 km NE Ohakune, altitude 690 m, mixed podocarp/broadleaf forest, sweep net, 03–04.02.2002, leg. M. Jaschhof (3x NZAC, SDEI-Dipt-0000813, SDEI-Dipt-0000856 & SDEI-Dipt-0001532; 3x SDEI, SDEI-Dipt-0001534). 3♂♂ same locality as previous, Malaise trap, 26.11–28.12.2002, leg. M. & C. Jaschhof & U. Kallweit (1x NZAC, SDEI-Dipt-0001536; 2x SDEI, SDEI-Dipt-0000597 & SDEI-Dipt-0000980). 2♂♂ South Island, Selwyn,



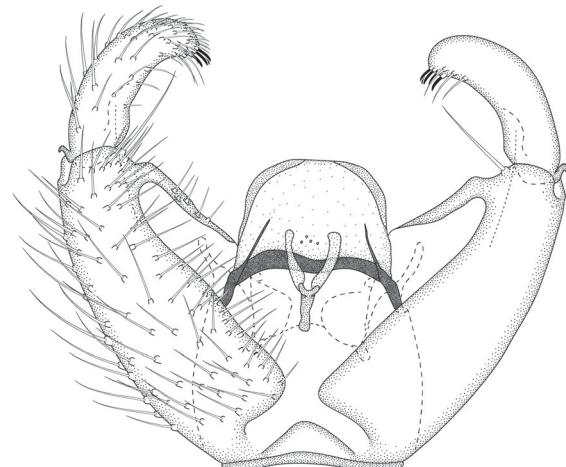
55



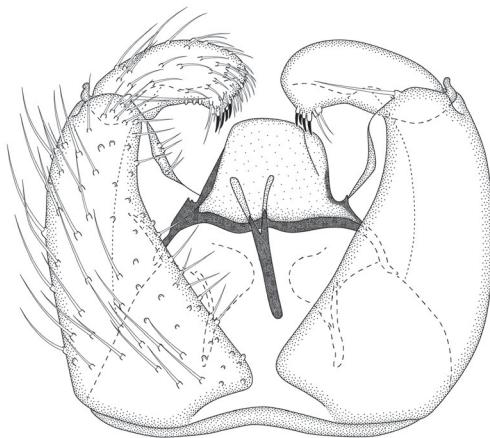
56



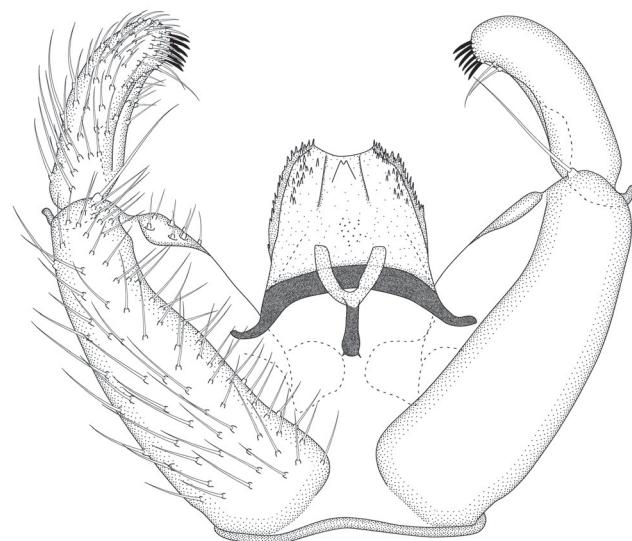
57



58



59



60

55–60  
100 µm

**FIGURES 55–60.** *Pseudolycoriella macrotegmena* complex, hypopygia. **55.** *Pseudolycoriella fiordlandia* sp. n. **56.** *Pseudolycoriella jaschhofi* sp. n. **57.** *Pseudolycoriella frederickedwardsi* Köhler **58.** *Pseudolycoriella tonnoiri* Köhler **59.** *Pseudolycoriella breviseta* Mohrig **60.** *Pseudolycoriella dentitegmena* sp. n.

Cass, Middle Bush, *Nothofagus solandri* forest, stream site, Malaise trap, 17.11.1998, leg. P.M. Johns (NZAC, SDEI-Dipt-0000719; SDEI, SDEI-Dipt-0000722). 3♂♂ South Island, Clutha, Catlins, Purakaunui Scenic Reserve, mixed podocarp/broadleaf/*Nothofagus* forest, Malaise trap, 27.01–05.03.2002, M. & C. Jaschhof (1x NZAC, SDEI-Dipt-0000531; 2x SDEI, SDEI-Dipt-0001140 & SDEI-Dipt-0001152).

**Description.** See Köhler & Mohrig (2016).

**Genetic distances.** The maximum p-distance between all eleven available COI sequences is 0.15%. The nearest neighbour is *Psl. gonotegmenta*, diverging by a minimum of 2.75%. All four available 28S sequences are identical and do not show any differences to those of *Psl. frederickedwardsi*, *Psl. gonotegmenta*, *Psl. huttoni*, *Psl. jaschhofi*, *Psl. macrotegmenata*, *Psl. plicitegmenata*, *Psl. robustotegmenata*, *Psl. subtilitegmenata*, and *Psl. wernermohrigi*.

**Remarks.** The presence of the dorsal structures on the tegmen has to be added to the description of Köhler & Mohrig (2016). These structures do not exceed half the length of the tegmen.

### *Pseudolycoriella jaschhofi* sp. n.

(Fig. 56)

urn:lsid:zoobank.org:act:6010CE99-5267-410E-8C40-D522E7D378B3

**Material studied.** *Holotype male.* New Zealand: South Island, Buller, Lewis Pass, altitude 850 m, tussock grassland at beech forest edge, Malaise trap, 26.11–25.12.2001, leg. M. & C. Jaschhof (NZAC, SDEI-Dipt-0001199). *Paratypes.* 12♂♂ same locality and same date as holotype (6x NZAC, SDEI-Dipt-0001036, SDEI-Dipt-0001207, SDEI-Dipt-0001209 & SDEI-Dipt-0001210; 6x SDEI, SDEI-Dipt-0001198, SDEI-Dipt-0001201, SDEI-Dipt-0001203 & SDEI-Dipt-0001217). 5♂♂ South Island, Southland, Fiordland, Fiordland NP, 4 km E Milford Sound, mixed broadleaf/*Nothofagus* forest, sweep net, 07.01.2002, leg. M. Jaschhof (3x NZAC, SDEI-Dipt-0001332, SDEI-Dipt-0001341 & SDEI-Dipt-0001342; 2x SDEI, SDEI-Dipt-0000892 & SDEI-Dipt-0000896). 8♂♂ South Island, Southland, Fiordland, Fiordland NP, Hollyford River Valley, Moraine Creek Track, mixed podocarp/*Nothofagus* forest, Malaise trap, 05–24.01.2002, M. & C. Jaschhof (4x NZAC, SDEI-Dipt-0001343, SDEI-Dipt-0001345, SDEI-Dipt-0001512, SDEI-Dipt-0001513; 4x SDEI, SDEI-Dipt-0001344, SDEI-Dipt-0001511, SDEI-Dipt-0001514 & SDEI-Dipt-0001515). 8♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, Deer Flat, *Nothofagus* forest, Malaise trap, 04–24.01.2002, leg. M. & C. Jaschhof (4x NZAC; 4x SDEI). 1♂ same locality as previous, Malaise trap, 01–20.12.2002, leg. M. & C. Jaschhof & U. Kallweit (SDEI, SDEI-Dipt-0000962). 6♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, opposite Earl Mountain Tracks, *Nothofagus* forest, Malaise trap, 05–24.01.2002, leg. M. & C. Jaschhof (3x NZAC, SDEI-Dipt-0000848, SDEI-Dipt-0000850 & SDEI-Dipt-0000851; 3x SDEI, SDEI-Dipt-0000852, SDEI-Dipt-0000868 & SDEI-Dipt-0000872). 4♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Hollyford River Valley S Divide Creek, mixed *Nothofagus*/broadleaf forest, Malaise trap, 06–24.01.2002, leg. M. & C. Jaschhof (2x NZAC; 2x SDEI).

**Description. Male.** **Head** brown; eye bridge one to three facets wide. Flagellomeres concolourous with scape and pedicel; fourth flagellomere 2.6–3.1 times as long as wide; necks of flagellomeres differentiated; surface of flagellomeres rough with deep pits; sensilla of two different length; setae sparsely scattered, approximately as long as flagellomere width, bases of setae with slightly raised coronas. Prefrons and clypeus moderately bulging. Maxillary palp three-segmented; first palpomere longest, third slightly longer than second; first palpomere with up to five bristles and an inconspicuous small patch of sensilla. **Thorax** pale brown, paler than head. Posterior pronotum bare. Anterior pronotum with two to five bristles. Episternum 1 with four to ten bristles. Mesonotum with several longer bristles among the laterals and among the dorsocentral bristles. Scutellum with four robust and some shorter bristles. Katepisternum bicoloured, basal part pale brown, apical third brown; as long as high. **Wing.** Length 1.9–2.2 mm; width/length ratio 0.35–0.41. Membrane transparent and without macrotrichia, anal area present; all posterior veins distinct except faint stem of M, all without macrotrichia; apical quarter of R<sub>5</sub> with two to seven additional macrotrichia on ventral side; bM and r-m bare, r-m exceptionally with one to two macrotrichia; R<sub>1</sub> short, 0.67–0.80 times as long as R; M-fork longer than stem of M; c/w ratio 0.67–0.72; r-m and bM equal in length. Haltere pale brown. **Legs** pale brown; coxal bristles dark. Fore tibia with one to two bristles among vestiture on ventral side; tibial organ comprising more than half of tibial apex, consisting of a transverse patch of bristles surrounded by a robust circular border. Mid tibia with one or two anteroventral and two to four posterioventral robust bristles among vestiture. Hind tibia with several robust bristles on anteroventral, posterior and posterioventral sides and a longitudinal row of robust bristles, which extends along two-thirds of length of tibia. Basal tarsomere of all legs with conspicuous robust

bristles. All tibial spurs equal in length. Claws with teeth. **Abdomen.** Pale brown, with dark bristles. **Hypopygium** (Fig. 56) as pale brown as abdomen. Gonocoxites wider than long; ventrally v-shaped and not fused, without a basal lobe of bristles. Gonostylus slender, apical quarter curved inwards, 3.3–4.0 times longer than wide; apically with dense setae and a group of approximately eight small spines; subapically one short whip-lash hair, which is two times as long as the apical spines. Tegmen broad and membranous, only strongly sclerotized on lateral and basal margins; wider than long, with short parameral apodemes; apically membranous with a robust hood-like structure; dorsal structures absent. Area of teeth with six to 20 conspicuous teeth. Ejaculatory apodeme short and very dark with a large base. Posterior portion of gonocoxal apodeme long and brown. Anterior portion of gonocoxal apodeme apodeme long.

*Body size:* 1.8–2.5 mm.

*Female.* Unknown.

**Genetic distances.** The maximum p-distance between all 13 available COI sequences is 1.83%. The nearest neighbour is *Psl. teo*, diverging by a minimum of 4.92%. The maximum p-distance between all three available 28S sequences is 0.49% (this high p-distance results from some ambiguous positions at the beginning of one sequence [SDEI-Dipt-0001511]). Some of these sequences are identical to those of *Psl. frederickedwardsi*, *Psl. gonotegmen-ta*, *Psl. huttoni*, *Psl. macrotegmen-ta*, *Psl. plicitegmen-ta*, *Psl. robustotegmen-ta*, *Psl. subtilitegmen-ta*, *Psl. tonnoiri*, and *Psl. wernermohrigi*.

**Etymology.** The new species is named after Dr Mathias Jaschhof, to honour his work on the Sciaroidea and to express the author's thanks for his manifold support.

**Distribution.** New Zealand.

**Discussion.** Among the species of the *Psl. macrotegmen-ta* complex this new species can easily be recognised by the hood-like structure on the tegmen, which otherwise only appears in *Psl. aotearoa* and *Psl. zealandica*. Furthermore, *Psl. jaschhofi* has a very elongated gonostylus, which it only shares with the otherwise unmistakable *Psl. dentitegmen-ta*. *Pseudolycoriella attrita* Mohrig from Papua New Guinea has very similarly shaped gonostyli and tegmen (Mohrig, 2013), but a much smaller body size and shorter flagellomeres (1.8 vs. 2.6–3.1). Additionally, the two gonostylar spines of *Psl. attrita* are well developed and clearly visible among the apical setae, while in *Psl. jaschhofi* the spines are more numerous and not so easy to distinguish from the apical setae.

### *Pseudolycoriella fiordlandia* sp. n.

(Fig. 55)

urn:lsid:zoobank.org:act:0CEEA4EF-C3F2-427F-86D4-B4A203964228

**Material studied.** *Holotype male.* New Zealand: South Island, Southland, Fiordland, Fiordland NP, 3 km E Milford Sound, mixed podocarp/broadleaf forest, Malaise trap, 01–21.12.2002, leg. M. & C. Jaschhof & U. Kallweit (NZAC). *Paratypes.* 5♂♂ South Island, Southland, Otago Lakes, Fiordland NP, Eglinton River Valley, Deer Flat, *Nothofagus* forest, Malaise trap, 01–20.12.2002, leg. M. & C. Jaschhof & U. Kallweit (2x NZAC; 3x SDEI).

**Description. Male.** **Head** brown; eye bridge two to three facets wide. Scape and pedicel concolourous with flagellomeres; fourth flagellomere 2.4–2.8 times as long as wide; necks of flagellomeres differentiated; surface of flagellomeres rough with deep pits; sensilla of two different lengths; setae sparsely scattered, approximately as long as flagellomere width, more curved towards the apex; some setae on the basal flagellomeres with conspicuous bases. Prefrons and clypeus moderately bulging. Maxillary palp three-segmented; first palpomere longest, third slightly longer than second; first palpomere with three to four bristles and an inconspicuous patch of sensilla. **Thorax** pale brown, slightly paler than head. Posterior pronotum bare. Anterior pronotum with five to eight bristles. Episternum 1 with six to eight bristles. Mesonotum with several longer bristles among the lateral bristles and among the dorsocentral bristles. Scutellum with four robust and some shorter bristles. Katepisternum bicoloured, basal part pale brown, apical third brown; as long as high. **Wing.** Length 1.8–2.0 mm; width/length ratio 0.39–0.42. Membrane transparent and without macrotrichia, anal area well developed; all posterior veins distinct except faint stem of M, all without macrotrichia; apical quarter of R<sub>5</sub> with macrotrichia on the ventral and dorsal side; bM and r-m bare, r-m exceptionally with one to two macrotrichia (in three of the paratypes, only developed on one wing each); R<sub>1</sub> short, 0.58–0.80 times as long as R; M-fork longer than stem of M; c/w ratio 0.60–0.75; r-m/bM 0.6–0.8 (not easy to measure due to faint stem of M). Haltere brown. **Legs** pale brown, except mid and hind coxae which are slightly darker; coxal bristles dark. Fore tibia with one to two spines among vestiture on ventral side; tibial organ comprising

more than half of tibial apex, consisting of a patch of bristles surrounded by a robust circular border. Mid tibia with three to four robust anteroventral and up to two posteroventral spines among the vestiture. Hind tibia with a dorsal, posteroventral and a ventral row of robust spines; the dorsal one three-quarters of the tibia length. Basal tarsomere of all legs with conspicuous robust spines. All tibial spurs equal in length. Claws with two teeth. **Abdomen.** Pale brown, with dark bristles. **Hypopygium** (Fig. 55) pale brown, like the abdomen. Gonocoxites longer than wide; ventrally v-shaped and not fused, without a basal lobe of bristles; apex of gonocoxites stretched. Gonostylus curved, bean shaped, 2.8–3.4 times longer than wide; in basal third with a robust insertion area for the adductor tendon; apically with dense setae and a group of approximately ten small spines, which are not easy to distinguish; subapically one to two long whip-lash hairs. Tegmen large and strongly sclerotized; as long as wide, with very robust parameral apodemes; margin of tegmen laterally sclerotized and with a prominent ledge on each side; sclerotized margin apically interrupted by a small membranous area; dorsal structures present. Area of teeth with approximately ten tiny teeth. Ejaculatory apodeme very dark with a large slightly paler base. Posterior portion of gonocoxal apodeme apodeme broad and brown. Anterior portion of gonocoxal apodeme apodeme medium-sized and dark.

**Body size:** 1.6–1.9 mm.

**Female.** Unknown.

**Genetic distances.** No genetic data available.

**Etymology.** The new species is named after the Fiordland National Park where the type locality and the second sampling site are located.

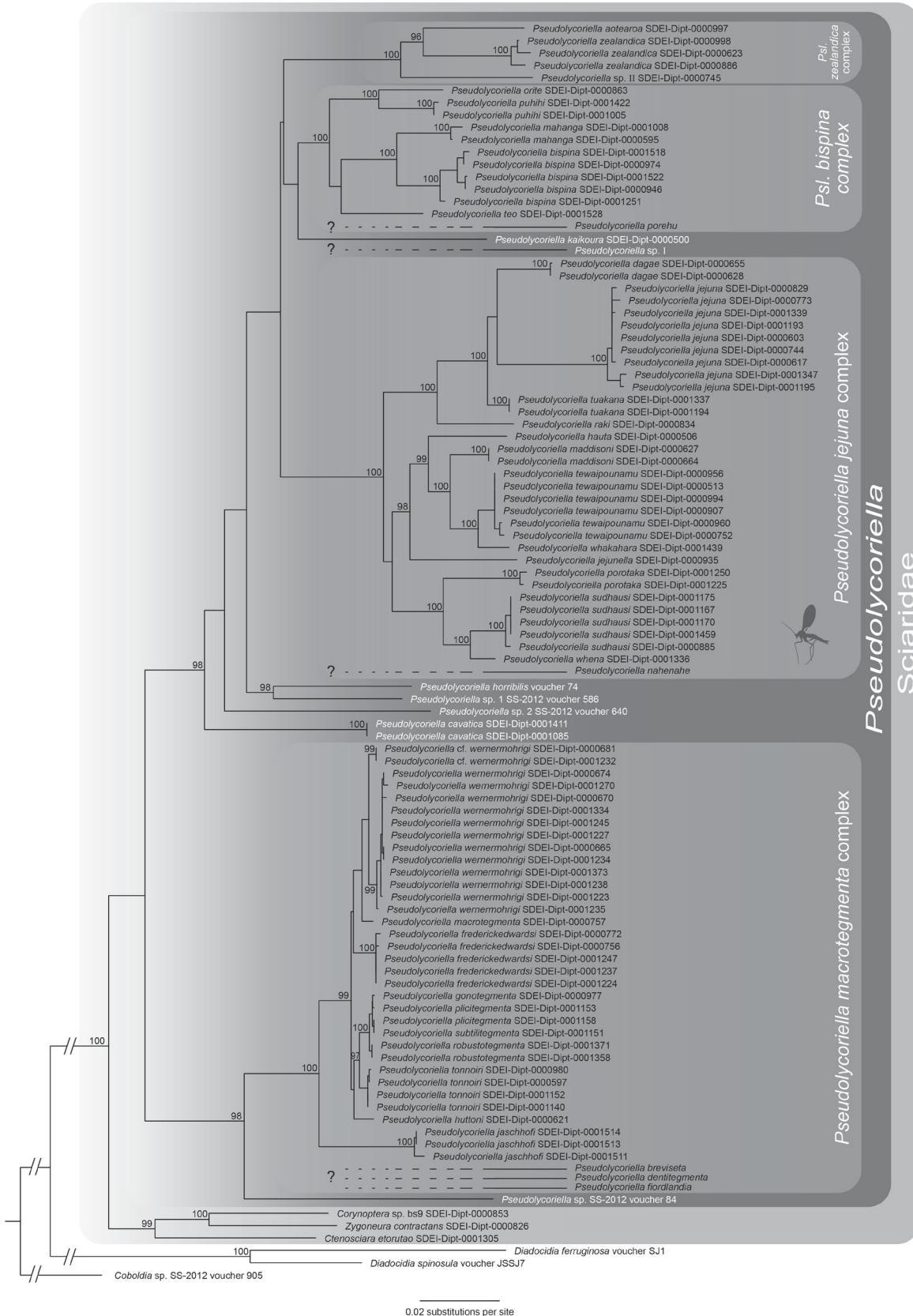
**Distribution.** New Zealand.

**Discussion.** *Pseudolycoriella fiordlandia* has a unique tegmen with conspicuous lateral ledges and very robust parameral apodemes. In addition, the gonostyli are more curved than in the other species of this complex.

## Phylogenetic tree

According to the software Modelfinder (implemented in IQ-TREE), the best DNA substitution model for the three concatenated nuclear and mitochondrial genes is GTR+F+R4 (general time reversible model with unequal rates and unequal base frequencies (Tavaré 1986)). The phylogenetic tree based on this model is shown in Figure 61. The Log-likelihood of this tree is -18,016.987. The calculation strongly supports the monophyly of the Sciaridae but does not yield an adequately supported UFBootstrap value for the *Pseudolycoriella* cluster. The first internal branching results in two major subclades both with high UFBoot support. One major subclade contains an undescribed *Psl.* species from China and the New Zealand *Psl. macrotegmena* complex, whose status as a monophyletic group is highly supported. The first internal branching of the *Psl. macrotegmena* complex is *Psl. jaschhofi* and remaining species of this complex. The remaining species do not show high genetic distances. The clusters of specimens belonging to *Psl. wernermohrigi* and *Psl. frederickedwardsi* are supported by high UFBootstrap values ( $\geq 99\%$ ). Another highly supported cluster contains a mixture of four species—*Psl. gonotegmena*, *Psl. plicitegmena*, *Psl. subtilitegmena* and *Psl. robustotegmena*. None of these four species can be discriminated by the genetic markers used.

The second major subclade of *Pseudolycoriella* consists of *Psl. cavatica* + (an undescribed *Psl.* species from Korea + (the remaining New Zealand representative of *Pseudolycoriella* + (*Psl. horribilis* + another undescribed *Psl.* species from Korea))). The clade of the remaining representatives of *Pseudolycoriella* shows an unsolved trichotomy of the supported *Psl. jejuna* complex, a supported branch of the *Psl. zealandica* complex and an unsupported branch of *Psl. kaikoura* + *Psl. bispina* complex. The branch of the *Psl. jejuna* complex and nearly all its internal nodes with only two exceptions are highly supported. The two internal nodes of the *Psl. zealandica* complex are supported by the UFBootstrap approximation. Nearly all internal nodes of the *Psl. bispina* complex are also highly supported. Only the position of *Psl. teo* within the *Psl. bispina* complex remains uncertain.



**FIGURE 61.** Phylogenetic tree of the New Zealand *Pseudolycoriella* species inferred from Maximum Likelihood analysis based on three concatenated genes (COI, 16S, and 28S; total length 3,053 bp) applying the model GTR+F+R4. Ultrafast bootstrap values (UFBoot; 1,000 replicates) are given if these values are greater than or equal to 95%. Intraspecific UFBoot values are not specified. *Pseudolycoriella* species without available genetic data are also inserted and assigned to a species complex according to the morphological results.

## Discussion

The present study demonstrates a high diversity of New Zealand *Pseudolycoriella* species. The number of species has increased from seven to 36. Twenty-eight species were described as new for science and one species—the widely distributed *Psl. cavatica*—is newly recorded for New Zealand. Two further species are only represented by female specimens and have not yet been described. Hopefully future projects will record and recognise their male counterparts by barcode matching. These undescribed species and the circumstance that it was not possible to provide new records for *Psl. breviseta* indicates that even more, still unknown New Zealand *Pseudolycoriella* species are to be expected. The existence of such a large proportion of new species is not unusual in sciarids. For instance, Savage *et al.* (2019) stated that 129 described Canadian sciarid species exist, compared to 2,863 BINs. Even in the comparatively well studied Western Palaearctic the use of molecular techniques has revealed hitherto unknown cryptic species complexes (Heller *et al.* 2016). Subsequently, the small community of sciarid taxonomists still faces a mammoth task.

Interestingly, apart from two species—the probably introduced *Psl. cavatica* and the autochthonous *Psl. kaikoura*—nearly all New Zealand *Psl.* species are grouped in only four different species complexes. In the present study the term “species complex” is used instead of “species group”. The reason is that in sciarid taxonomy “species groups” are used for a provisional clustering of similar species mostly for determination purposes and without detailed consideration of the underlying phylogenetic relationship. Another reason for avoiding the term “species group” is that three of the discovered species complexes could be incorporated into the *Psl. bruckii* group without any problems. Only the *Psl. macrotegmenata* complex can be considered as a separate group of species, which is not covered by the currently used species group concepts for *Pseudolycoriella*. Among these *Pseudolycoriella* taxa, the applicability of molecular markers, in particular the frequently used COI gene, differs greatly. Of the New Zealand members of the *Psl. bruckii* group (represented by *Psl. cavatica* and *Psl. kaikoura* and the species complexes grouped around *Psl. bispina*, *Psl. jejuna*, and *Psl. zealandica*) the genetic distances are sufficient enough to allow an allocation of a sequence to a known species. The lowest p-distance between two specimens of different species ranges from 3.51% (between *Psl. tewaipounamu* and *Psl. whakahara*) to 12.21% between (*Psl. aotearoa* and *Psl. zealandica*). Only the intraspecific p-distance of *Psl. puhihi* is in this range (4.44%). Otherwise this value lies between 0% and 3.07% in *Psl. bispina*. The median of the lowest interspecific p-distances is 7.14%. The median of the intraspecific p-distances is 0.76%. Contrary to the *Psl. bruckii* group, the COI p-distances between species of the *Psl. macrotegmenata* complex are lower and do not always allow a clear delimitation of the species. This issue is best illustrated by *Psl. gonotegmenata*, *Psl. plicitegmenata*, and *Psl. subtilitegmenata*, which partly show identical sequences. Among the remaining species the value of the lowest p-distance ranges between 0.61% (between *Psl. gonotegmenata* and *Psl. robustotegmenata*) to 4.92% between (*Psl. jaschhofi* and *Psl. teo*). The median is 1.84%. The intraspecific p-distances range from 0% to 1.83% (*Psl. jaschhofi*), with a median of 0.15%. Such inapplicability of COI barcoding has also been observed in other insect groups, e.g. in some sawflies (Prous *et al.* 2017) and in some hoverflies (Haarto & Ståhls 2014). It is to be assumed that the *Psl. macrotegmenata* complex has undergone a recent radiation and that this speciation process is not yet reflected by the nuclear 28S gene. In the mitochondrial COI gene the radiation is only partially mirrored, e.g. three species that are morphologically well separated show identical COI sequences, possibly due to incomplete lineage sorting. Introgression may also be a factor. In this context, it is noteworthy that two of these probably recently diverged species—*Psl. plicitegmenata* and *Psl. subtilitegmenata*—were caught at the same locality, i.e., occur sympatrically. This implies the existence of adequate reproductive barriers. Some other sibling species pairs were caught at the same localities, e.g. *Psl. jejuna/Psl. tuakana* and *Psl. aotearoa/Psl. zealandica*. However, in these cases at least the COI sequences support the morphological species delimitation.

A temporary result of the present study is a predominance of the genus *Pseudolycoriella* with 36 species compared to a total of 82 New Zealand sciarid species. This highly unnatural situation will change with further taxonomic work in the other Sciarid genera of New Zealand. It is highly likely that the genera *Corynoptera* Winnertz and *Ctenosciara* Tuomikoski also contain several undescribed species and cryptic species complexes in New Zealand.

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